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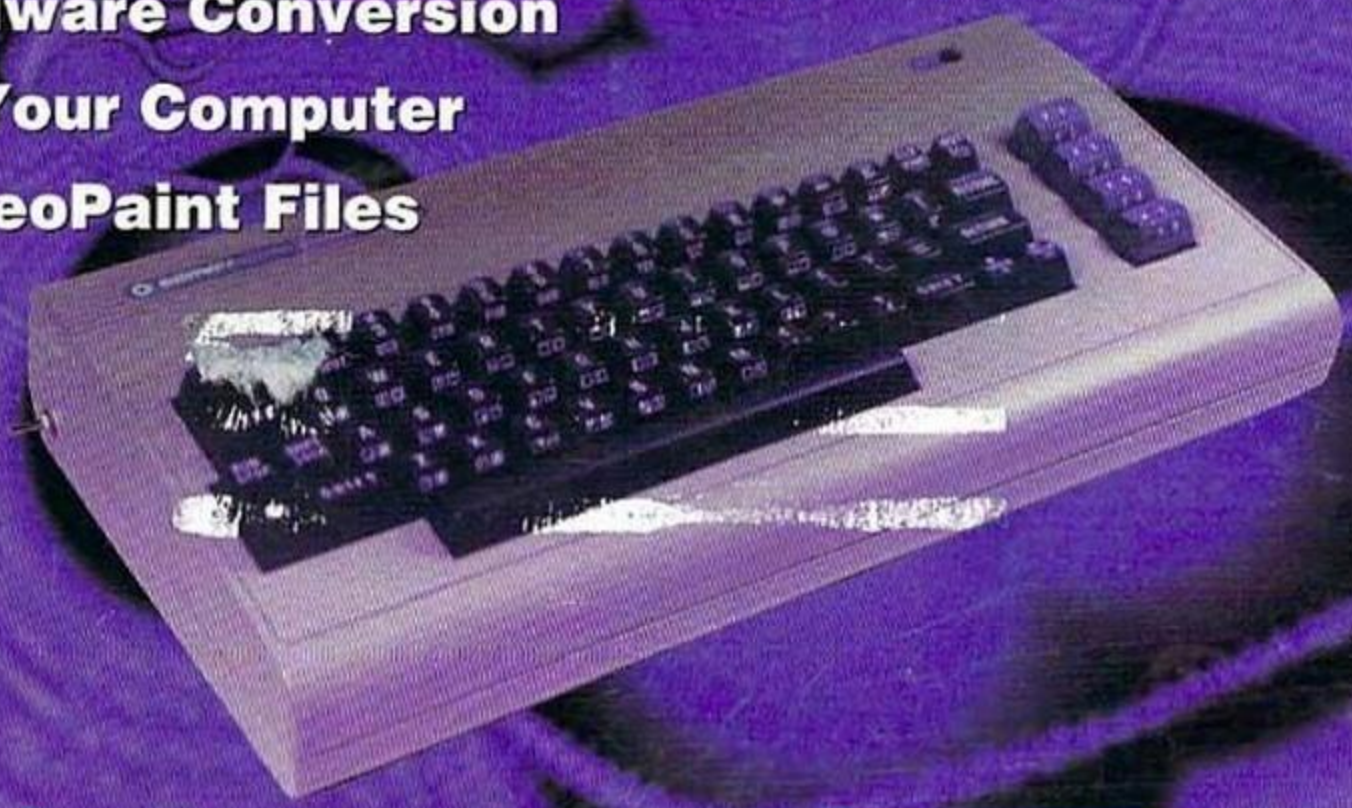

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CONTENTS

• ISSUE 20 • Published July 1997 •

COMMODORE WORLD
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GENERAL MANAGER
Charles R. Christianson

◆

EDITOR
Doug Cotton

◆

ADVERTISING SALES
Charles A. Christianson
(413) 525-0023

◆

GRAPHIC ARTS
Doug Cotton

◆

ELECTRONIC PRE-PRESS & PRINTING
Mansir/Holden

◆

Cover Design by Doug Cotton

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FEATURES

10 PLAYING GAMES WITH GEOS: ENGEOYABLE ENTERTAINMENT
Bruce Thomas
12 COMMODORE'S MAJOR DEVELOPER
K. Dale Sidebottom
46 HARD TIPS
Doug Cotton

REVIEWS

18 THE COMPLEAT WALT
Jason Compton
22 SHORT WAVE LISTENER
Jim Brain

COLUMNS

18 JUST FOR STARTERS
Jason Compton
22 GRAPHIC INTERPRETATION
Paul Sullivan
26 DEMOMANIA
Sherry Freedline
30 CARRIER DETECT
Gaelyne R. Gasson
34 GEOPROGRAMMIST
Maurice Randall
42 816 BEAT
Mark Fellows

DEPARTMENTS

2 FROM THE EDITOR
4 BACKTALK
6 ON THE HORIZON
8 COMMODORE TRIVIA
48 CLASSIFIED ADS
48 ADVERTISER'S INDEX

See Our CHECKSUM Utility On Page 47

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FROM THE EDITOR

Commodore World Stolen!

Whoever it was that said, "It's always something..." was right. Seems like whenever we think things are going well, something comes along to throw a wrench in it. A few weekends ago, as we were all away from the office, someone decided they liked some of our office computers and other equipment. While they didn't bother taking anything that said Commodore on it, they did make off with a couple of important systems, including the one used to produce Commodore World. Luckily, we did have backups of all the most important data, but it took a few days to get replacement equipment, get everything installed on it, and start pulling all the loose backups together to re-create our work. I suspect you'll hear about the break-in from other sources as well, so we wanted to let you know here that it wasn't too devastating, that there was nothing taken that couldn't be replaced with a little time or money. Meanwhile, we're keeping an eye on the local pawn shops, and have had an advanced security system installed to deter future repeats of this sad occurrence.

Now on to the issue at hand, or rather, the Issue in your hands. This was a tough issue to put together for a couple of reasons. Of course, the break-in was one; but a lot of the authors came in "long" as we say, and because of this we've had to reduce the number of columns in this issue to fit everything in—despite going an extra 8 pages! Hopefully those of you who live for the columns that don't appear in this issue won't be too angry with us for that, and bear in mind—what comes around, goes around... I suspect we'll boot a couple of those that ran long this issue in one of the next two issues to make room for longer versions of the missing columns.

Meanwhile, I hope all of you are having a good summer, and look forward to hearing from you. Please do write!

Doug Cotton
Editor

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BACKTALK

LETTERS AND QUESTIONS FROM OUR READERS

Dear CW,

In Issue # 16, Aug/Sept 1996, Page 4, you said you might let us in on how to convert a C-64 from NTSC to PAL or vice-versa.

My C-64 is PAL configured and was manufactured in England. I bought it new in Germany in 1984. My Monitor is a Model 1802 and is NTSC configured. I use a transformer to get the necessary 110 volts. It operates fine on 50 Hz, but since the input is from a PAL source I'm only getting a black and white picture. I had to get it repaired last week (a shorted-out power supply) and so I asked my German Repairman if he could modify the Monitor from NTSC over to PAL. After a few days mulling over the schematic diagram for the 1802, he declined because there are no instructions and he felt it too complicated a job to just "wing-it."

I'm sure when I show him your Magazine and hint that converting the C-64 Computer can't be all that complicated since there are only three steps, he'll say he might try it but only if some instructions or a check list are provided together with the parts).

-RB

Thanks for reminding us about that. You'll find it in this issue, as an installment of our occasional Hard Tips column. Hope this does the trick for you!

Dear CW,

In Issue #19 I read your answer on a user's question about GEOS on ROM. You told him about the difficulties and that booting GEOS from a RAMLink is the better way. This all may be right, but never the less there is the possibility to get GEOS on ROM. The German GEOS USER CLUB offers, to burn your GEOS on ROM. You have to send your Boot Disks to the Club ant tell them about your configuration and you will get back a Cartridge for the expansion port. Of course you will need a cartridge port expander to use a Ram Expansion too, but if you already own a REU or GEORAM, this is cheaper then buying a RAMLink and even faster too, I think.

For the EPROM-burn-service you have to pay 99.00 DM (about $60.00), but actually I do not know if the GEOS USER CLUB also provides this service outside of Europe. If you want to inquire, you may have a look to the Club's Web Pages at http://www.GeosUserClub.com or write to: Jürgen Heinisch & Thomas Haberland, GbR, "Geos User Club" Moerser Str. 11 in D-46286 Dorsten, Germany, Phone:+49-(0)-2866-96101, Fax:+49-(0)- 02866-96102

-AN

Yes, we're aware of the GUC's GEOS ROM, but they can only supply the German version of GEOS. Also, as you pointed out, you must send in your disks and describe your configuration. As we explained in the response you mentioned, having GEOS pre-configured on a ROM is fine until your configuration changes. We haven't seen the ROM version by the GUC, but we have to wonder just what do you do when you decide to switch to a different deskTop, or buy a new device that requires a different CONFIGURE file. This is a large part of why we feel booting from a power-backed RAM device is a better alternative—the ability to reconfigure the system yourself is never lost.

Dear CW,

Just got the last issue! Another excellent job! I especially like the 816 beat column, and Doug's BASIC treatise was interesting too.

I would love to see columns on programming geoBASIC and Power C too. DON'T think of dropping Maurice Randall's geoProgrammist though... I couldn't bear to lose it.

Keep up the great work, I know it must be hellishly busy for you all.

-MF

Thanks, and no, we're not planning to drop geoProgrammist. In fact, Maurice ran very long in this issue with an extensive look at dealing with geoPaint files, which I'm sure you'll enjoy!

Dear CW,

I read with great interest the first installment of K. Dale Sidebottom's series, and agree with most of his observations. The Commodore community tends to suffer (with more than a little justification) from a degree of paranoia. We're predisposed to interpret events like the delay in releasing the SuperCPU as the first sign of "abandonment" by yet another trusted supplier. Given our history, that isn't really surprising. Unfortunately, as Mr. Sidebottom pointed out, such kneejerk reactions contribute to a downward spiral of users abandoning the machines—which in turn forces suppliers to turn to other ventures for their livelihood, prompting more users to abandon their Commodores...

If one takes a step back to look at the overall picture, however, Commodore users should be heartened by the events of the last year or so. GeoFAX (by Maurice Randall), Novaterm 9.6 (by Nick Rossi), Gaelyne Gasson's The Internet for Commodore Users, CMD's release of the SuperCPU 64 and announcement of the SuperCPU 128, release of the Turbo232 cartridge, SuperRAM Card, etc., all bode well for the Commodore community for the foreseeable future.

Nick Rossi, during a guest spot on Delphi some months ago, was asked why he had bothered to create a major revision of Novaterm. He replied that the World Wide Web had brought users together in enough numbers to create the "critical mass" necessary to make programming for Commodore a viable option. Now, I don't imagine that Nick or anyone else thinks they will make their fortune providing this kind of support. Rather, I believe that the possibility of realizing a profit gives people like Nick, Maurice and Gaelyne a legitimate reason to do what they enjoy doing—exploring, developing and programming for the Commodore! Remember, too, that the profit motive helps to raise the standard of acceptability. Everybody wins when the user community is willing to purchase improvements. Authors are rewarded for superior efforts. Customers get better products. The downward spiral can be slowed, stopped or even reversed.

I urge anyone who hasn't already done so to GET ONLINE and see firsthand the high levels of support and interest that really exist. Have you seen "The Commodore Ring?" Have you visited the CMD or Loadstar websites? Have you browsed comp.sys.cbm postings? Break out that old 1670 modem and crank 'er up, for heaven's sake! Any

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regular visitor to the Commodore Roundtable on Genie, or Delphi's Commodore Users' Forum is bound to feel more comfortable about maintaining and expanding his or her own machine. I'm convinced that CMD's SuperCPU will result in yet another renaissance for Commodore. Consider for a moment the astonishing capabilities that have been squeezed from the original Commodore 64/128 designs over nearly two decades of development. Now consider the fact that CMD has just released (courtesy of the SuperCPU) an entirely new set of capabilities to some of the most talented programmers to be found anywhere! The numbers may be comparatively small, but new ideas are being developed and new programs are being written—even a "it can't be done on a Commodore" graphical web browser. New applications won't all happen tomorrow, but they will happen if the customer base remains. Yes, you will need to upgrade in order to take advantage of the next phase, but as has always been the case in our world, it can be done in stages: buy what you need when you can. Nobody is suggesting that you scrap what you own and start over at a cost of thousands of dollars. CMD isn't Intel; and the Randalls, Rossis and Gassons of our world aren't Microsoft.

I had the pleasure of driving from Long Island, NY to Michigan recently to attend the LACC Expo (I know - but please call me eccentric), where I finally got to meet some of the really fine people I've been conferencing with online for years. Maurice Randall was busily demonstrating the latest release of geoFAX along with his new version of the Geos operating system. Multiple resizable "windows", excellent drive/partition support, and speed (with the SuperCPU) on a par with my Windows Pentium made my mouth water. Another gentleman had a functional CD-Rom player running on a 128, cranking out music for the crowd. What impressed me most, however, was the enthusiasm I saw amongst the attendees. These are all just regular folks who simply enjoy the heck out of their computers and are willing to spend time, effort and yes-some money, on "the little engine that could."

Instead of worrying about how long CMD and a handful of programmers can possibly continue to support our computers, I suggest instead that we users take an approach that will increase our chances. What would you like to see come of all this? What would you be willing to buy? A new geoWrite that can perform text conversions (like to real ASCII) on the fly? Maybe a Perfect Print that can take full advantage of modern printers? Accelerated, high resolution graphics? A modern desktop publisher? Some very cool games? Nearly any idea that has previously been hampered by slow processor speed and memory constraints is now a possibility. As for you, CMD, what do you see on the horizon? You didn't make an investment like this just to see if it could be done. Give us a glimpse of the future!

-JL

Certainly some interesting comments. As for what CMD sees for the future, the company has tried to make it policy to avoid talking about projects that aren't immanently certain to become products. This often generates calls to CMD by users with legitimate questions, but questions that usually can't be answered yet, due to a product being too early in the development stages. This eats up important time that could otherwise be spent working on the project itself. And while talking about future products might keep some folks in the market who would otherwise leave, if those things don't come about in a timely manner—or at all—it might cause even more users to head for the door. Another catch-22. However, you'll want to take a look at the second installment from Dale, because he asked us some very pointed questions, got some very pointed answers... and because we're publishing the series "as-is," he's able to tell you about at least one project that CMD has in mind.

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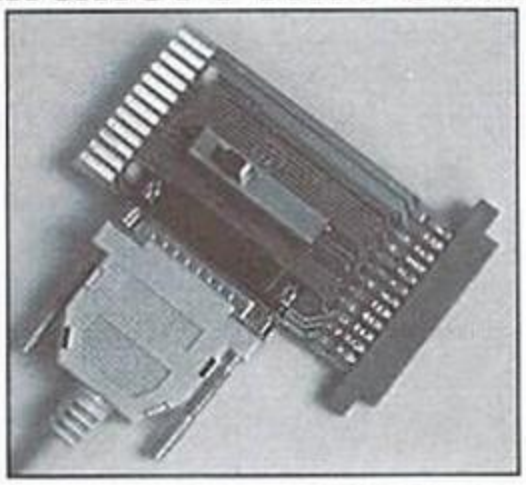

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CW4	Commodore World Issue 4	CW14	Commodore World Issue 14
CW5	Commodore World Issue 5	CW15	Commodore World Issue 15
CW6	Commodore World Issue 6	CW16	Commodore World Issue 16
CW7	Commodore World Issue 7	CW17	Commodore World Issue 17
CW8	Commodore World Issue 8	CW18	Commodore World Issue 18
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ON THE HORIZON

COMMODORE AND COMPUTER INDUSTRY NEWS

Arkanix Labs Press Releases

Seattle (March 15, 1997) - Here is a list of the products we are working on for the 1997/1998 time period. We at Arkanix Labs believe this shows our dedication to the C64/C128 platform. When each product is available we will release another announcement. We are working on a paper catalog which should include pictures of hardware and screenshots from programs.

"MODplay 128 v1.0" US$19.95 (Available: NOW). Playing MODs on your C128 is possible now, thanks to this program. The software supports Protracker, Sound Tracker, Star Trekker, and Noise Tracker formats. MODplay 128 can play at 4bit or 8bit achieving upto 13Khz output depending on your hardware setup. Support for upto two megabytes of REU memory for playing larger MODs. This is the basic MONO Drivers version. All programming performed by Nate Dannenberg. Available on 5.25" and 3.5" formats. Requirements: REU (17xx), Recommended: DigiMAX.

"MODplay 128 v1.5" US$9.95/$19.95 (upgrade/full) (Available: MID 1997). Stereo drivers added to MODplay 128. This enhances MODplay 128 v1.0 to write RAW and WAV formats to disk. Requirements: Dual SID or SID Symphony, MODplay 128 v1.0 (upgrades), Recommended: DigiMAX

"NetStack" US$14.95 (Available: MID 1997). This will be TCP stack software. At the moment we know we'll include SLIP, time will tell if PPP is possible. A developer pack will be included, we're hoping this will become the standard for this market. Robin Harbron will be handling all programming with this package. Requirements: Swiftlink/Turbo232, REU (17xx).

"AVLink 128" US$19.95 (Available: LATE 1997). Internet audio and video "phone" software. First stages of programming on this have started now, Nate Dannenberg and Robin Harbron are handling the programming duties. Requirements: NetStack, Swiftlink/Turbo232, 8BSS, REU (512k+).

"Web Ranger" & "Web Ranger SC" US$24.95 (Available: EARLY/MID 1998). World Wide Web browser with C64/C128 and SuperCPU versions planned. Jon Mines will be handling the majority of the programming here. Requirements: NetStack, Swiftlink/Turbo232, REU (512k+).

"NetMail" & "NetNews" US$19.95 (package) (Available: MID/LATE 1997). Internet mailer and Usenet news reader software. Robin Harbron will handle the programming tasks here. Requirements: NetStack, Swiftlink/Turbo232, REU (17xx).

"Sound Studio 128 v3.8" US$ FREE (Available: NOW). A free copy is available from the Arkanix Labs homepage. Programmed by Nate Dannenberg.

"Sound Studio 128 v4.0" US$19.95 (Available: LATE 1997/EARLY 1998). All programming to be handled by Nate Dannenberg. Requirements: REU (17xx). Recommended: Dual SID.

"Super Lazer Duel" US$19.95 (Available: LATE 1997/EARLY 1998). This version is what the original should have been, with new features like audio samples, animations, level editor, much improved game play, difficulty levels, plus more. Plain C64 and SuperCPU 64 version planned. Jon Mines will be handling the programming here. Requirements: NetStack and Swiftlink/Turbo232 (for Internet play only).

"Crimson Twilight" US$19.95 (Available: MID/LATE 1998). This will possibly be the first in a series of role playing/adventure games. Plans for a "talkie" version for SuperCPU are still alive. The programming will be handled by Jon Mines and Nate Dannenberg. Requirements: REU (512k+) or RAMLink. Recommended: CMD HD.

"Gamepack #1" US$19.95 (Available: MID 1997). Games. Included are: Lazer Duel, Acid Runner, Slaterman, Drip, Gangster, Ghosttown, Army Days, The Castle, TimTris, and Hans Kloss.

"Gamepack #2" US$19.95 (Available: MID 1997). Games. Included are: Hyper Cars, Castle, Lazarus, Arctic Hunt, Madrax, Connection, The King, Time Traveller, Nocturno, and Cosmic Hero.

"Gamepack #3" US$19.95 (Available: LATE 1997). Games. Included are: Colormania, Coldiarus, World Conquest, Memomania, Lingos, Zytron MegaBlast, Kulfon in Demonland, Valdgir's Swords, and Mean Car.

"8BSS" US$49.95 (Available: NOW). An 8bit stereo sampler for C64/C128. Sound Studio 128 v3.8 is included with this hardware. This board also works with AVLink 128. Programming information available upon request, or from Arkanix Labs homepage. Designed by Nate Dannenberg.

"DigiMAX" US$24.95 (Available: NOW). A four channel digital/analog converter for C64/C128. Programming information available upon request, or from Arkanix Labs homepage. Designed by Nate Dannenberg.

"Dual SID" US$34.95 (Available: NOW). Our version of a board to give the C64/C128 stereo sound. Works with Sound Studio 128 v3.8 and above, AVLink 128, MODplay 128 Stereo, and all of Mark A. Dickenson's Stereo programs. This board is compatible with RAMLink when addressed at $D700. Two different versions of the board are available to accomodate CSG 6581 and CSG 8580 SID chips. Requirements: C64/C128, one extra SID chip which should be indentical to SID on motherboard.

"PowerSID 2400" US$ N/A (Available: EARLY 1998). Adds 8 SIDs to produce 27 voices of polyphony sound on C64/C128. Designed by Nate Dannenberg and Shaun Halstead.

"PowerSID 4000" US$ N/A (Available: EARLY 1998). Combines the Enhanced 8/16 board with PowerSID 2400 to create the ultimate stereo sampling hardware for C64/C128. Designed by Nate Dannenberg and Shaun Halstead.

Seattle (July 1, 1997) — Arkanix Labs today completed work on their C128 based MOD player known as MODplay 128. This software enables C128 users to play 4 track MODs in four different formats: ProTracker, Sound Tracker, Star Trekker, and Noise Tracker. MODplay 128 can play MODs at 4bit or 8bit resolution achieving up to 13Khz output. The software includes support of REUs up to 2mb in size for larger MODs.

Also announced were three audio based hardware enhancements. The first is DigiMAX, a four channel digital/analog converter. Secondly,

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is the Dual SID board which gives the C64/C128 stereo sound. Two versions of the board are available to accommodate for the two different SID chip versions. Finally is the 8Bit Sound Sampler (8BSS), and 8bit stereo sampler for C64/C128. Included with the package is a free copy of Sound Studio 128 v3.8, sample recording and editing software.

Arkanix Labs is taking a new approach to the selling of their hardware products. The full parts lists and schematics are available from their homepage, this way ordering from them is not required if you can handle a soldering iron. But for the non-soldering types out there they provide a service for ordering pre-made boards.

Programming information for the hardware is available upon request. Pricing information is available from the Arkanix Labs homepage at www.arkanixlabs.com, or email to catalog@arkanixlabs.com will provide an online, text only catalog of our current and future products.

C64 HTML Viewer

The first HTML viewer for the good old C64. Yes it's here, and it's called FairligHTML. Two version have been released: Version 0.99 (shareware) and Version 1.00 (registered version). Cost of the registered version had not been disclosed at press time. Note: This program only views local files—it has no ability to connect to the Internet.

Features - The registered version handles files up to approx. 35k. The shareware version has slightly less memory available. The HTML parser in the viewer allows the following HTML commands to be decoded: HTML, /HTML, HEAD, /HEAD, TITLE, /TITLE, BODY, /BODY, HR (parameters are ignored), P, BR, A NAME, A HREF, /A, H (headings, all sizes supported), CENTER, /CENTER, PRE, /PRE, IMG (only in registered version).

Some HTML commands (as the header-commands, H1, H2 etc.) may contain additional parameters for how to center the line. Example: H1 align="center" or H2 align="right". Commands other than those specified above are ignored and should not create compatibility problems. The shareware version is available for downloaded at the Fairlight web site.

Internet Book Update

Reynella, South Australia (17 June, 1997) - VideoCam Services Announces "The Internet for Commodore C64/128 Users, 2nd Edition", new WWW Domain Name and TIFCU Mailing List.

The Internet for Commodore C64/128 Users, 2nd Edition - VideoCam Services is pleased to announce that the second edition of "The Internet for Commodore C64/128 Users" has been published, and has been shipping since the 13th of June, 1997. There were several reasons for publishing a 2nd Edition:

- The weight of the first edition varied between 498 and 503 grams. Shipping costs rise significantly at 500 grams. Minor typesetting changes were made to the index and glossary to reduce the weight of the book without sacrificing content. Actual book content has increased.
- Only one Australian Internet provider was listed in the Appendix. This oversight (as well as minor typographical errors) have been corrected.
- Jim Brain of Brain Innovations, Inc. recently announced changes in services offered to the Commodore community, adding FTPmail and Listserv services to replace his MAILSERV program. Additionally, the Commodore FTP site used extensively for examples in the book ceased to exist and was transferred to Jim Brain's site. VideoCam Services felt there was enough change to warrant updating this information in The Internet for Commodore C64/128 Users.
- The opportunity to have the book catalogued for the National Library of Australia (similar to the U.S. Library of Congress). This service provides information about books to the worldwide database for books in print and is used by bookstores and libraries for ordering.

New Domain Name - VideoCam Services announced today that the World Wide Web pages formerly located at http://hal9000.net.au/~moranec or http://hal9000.net.au/~rgasson are now accessible at their new domain: videocam.net.au.

The following World Wide Web pages have been relocated within the Website: VideoCam Services (http://videocam.net.au/), The Internet for Commodore Users (http://videocam.net.au/tifcu.html), Book Orders (http://videocam.net.au/bookord.html), QWKRR128 and Browser (http://videocam.net.au/qtoc.html). Also, Gaelyne Gasson's personal and Commodore related pages have changed to http://videocam.net.au/~gaelyne. The Commodore FTP site sponsored by VideoCam Services remains unchanged. The directories are located at hal9000.net.au /pub/cbm.

TIFCU Mailing List - VideoCam Services is continuing support for "The Internet for Commodore C64/128 Users" book by offering an Email Mailing list. Named "TIFCU" (an acronym for "The Internet for Commodore Users"), the mailing list will serve as a support group for those who have purchased the book, but it's open to anyone interested. The intention of the list is to help participants learn to use Internet resources and keep up with Internet changes that relate to Commodore interests. To subscribe to TIFCU, Email majordomo@hal9000.net.au and in the body of the message (not the subject line) type: subscribe tifcu.

VideoCam Services, 90 Hilliers Rd., Reynella 5161, South Australia, Phone/Fax: +61 8 8322-2716 Email: videocam@hal9000.net.au.

Commodore Gazette

The Commodore Gazette (no relationship to the defunct Computes Gazette) is a disk-based publication produced by Christopher Ryan, and began production in late 1995. The publication is supplied on two 5.25" disks (1541 or 1571), or one 1581 disk. Subscriptions are $22 per year, with rates going up in October 1997 to $25/yr. (subscriptions are offered for 1 to 4 years). The publication features PD Programs from Jim Green, Programs from Kenneth Barsky, Demos from Germany (New & Current), C= News and information, Subscription info and back issues, Things I need / Things for sale, Want ads / Tips & Tricks, and a C-128 section. Contact: Commodore Gazette, c/o Christopher Ryan, 5296 Devonshire Road, Detroit, MIchigan 48224-3233.

CMD REUs

Creative Micro Designs, Inc., has recently released two Commodore-compatible RAM Expansion Units (REUs). The CMD 1750 is identical in size and operation to the Commodore 1750, Containing 512K of RAM, this device uses the Commodore REC controller chip, and retails for $99.00. The 1750XL is similar to the 1750, but contains 2 Megabytes of RAM, four times the amount in the 1750. The 1750XL retails for $139.00. Both devices are housed in a standard cartridge (the same size as most game and utility cartridges), and come complete with documentation and utilities.

Creative Micro Designs, Inc., P.O. Box 646, E. Longmeadow, MA 01028-0646, 1-800-638-3263, http://www.cmdweb.com.

SuperCPU Development Continues

CMD has recently announced that the SuperCPU 128 has moved from the initial design stages to Alpha testing. Both the 64 and 128 modes of this device are presently being tested for basic functionality. CMD plans to move forward to the board layout and beta cycles in the next few weeks, but warns that an accurate release date cannot be estimated until those stages of development are complete.

In related development, the SuperRAM card, which can be used to expand the local memory of the SuperCPU 64 and 128, is scheduled to begin shipping by early August. Delays were caused by unavailability of one of the parts required, and by software development on GEOS patches to utilize the new RAM. These issues have now been resolved, and production of the board is underway.

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COMMODORE TRIVIA

by Jim Brain

Welcome to another edition of Commodore Trivia. As many of you may know, these trivia questions and answers have been donated by me to the Commodore community at large. Unlike other articles in *Commodore World*, these trivia questions have been placed in the public domain. I ask only that the trivia questions remain intact and unchanged, and that my name and address appear somewhere so users can contact me. The trivia is also used for a contest I run on the Internet; contact me at the included address for more information. Because curiosity has the best of me, I always welcome a note or postcard detailing where the trivia goes. I also welcome new questions—provided they come with the answers. Enjoy!

Jim Brain
Brain Innovations, Inc.
10710 Bruhn Ave
Bennington, NE 68007
j.brain@ieee.org

COMMODORE TRIVIA #19 QUESTIONS

$140 What was the model number of the microprocessor used in the first of the Commodore 264 Series?

$141 How fast could the microprocessor in the Commodore 264 Series theoretically run at?

$142 How many colors can a Commodore Plus/4 display at once?

$143 What anomaly exists in the numbering of the BASIC interpreter in the Plus/4 as 3.5?

$144 After the very first 1581 disk drives were introduced, Commodore found that the WD1770 disk controller chip in the drive could corrupt the disk in some situations. So, Commodore offered a replacement IC to fix the problem. What was the number of the replacement IC?

$145 On some very early CBM 1541 drives, what would happen if the serial bus CLOCK and DATA lines were high upon startup?

$146 In question $0F8, we learned that one must DIMension an array in BASIC if it will have more than 11 elements. Which Commodore produced reference book ncorrectly claims the need to DIMension arrays for more than 10 elements.

$147 Why should serial device number 31 not be used?

$148 On most VIC game cartridges from VIC-1910 up, toggling interlaced screen display can be done with a keypress. Which key?

$149 Which cartidge fitting the criteria in $148 does not toggle interlace display with the same keypress as the others? How is it toggled on this cartridge?

$14A The Commodore 64 KERNAL and BASIC code use every opcode in the 6510 CPU except three. Which three?

$14B For what purpose does the BASIC interpreter in a Commodore 64 require the Complex Interface Adaptor (CIA) IC?

$14C On the Commodore 128, the 80 column output is output by the VDC chip. What does VDC stand for?

$14D By now, most people know about the ill-fated Commodore 65. What were the specifications on the original Commodore 65 idea?

$14E When referring to the Commodore 4032, one usually states that one has a "thin 40" or a "fat 40". What does "thin" and "fat" signify?

$14F If you own a Commodore 4032, how can you tell which kind (thin or fat) you have?

$150 How many keys are on a standard Commodore B-128 keyboard?

$151 How many revisions of the 1541 printed circuit board are known to exist?

$152 The Commodore 6510 CPU has two internal I/O registers. Where in the Commodore 64 are these two registers located?

$153 The Commodore 64 cotains 64kB of memory. How many bytes is in 64kB?

$154 What is the name of the Commodore employee responsible for much of the Commodore 128 and 65 software development, among other accomplishments? (hint: initials are FB)

$155 In question $13F, we found out the message that was displayed after typing SAVE "",2. Why did Commodore change that message on the VIC-20?

$156 What was the number of Commodore 64 machines sold, within 4 million?

$157 What was the number of Commodore 128 machines sold, within 1 million?

$158 In 1985, Commodore previewed the Commodore LCD Laptop computer at the January CES show. How many software packages were to be built-in?

$159 In the Commodore LCD unit, what were the text screen dimensions?

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$15A What is the version number of the only known "bug-free" VIC-II IC?

$15B Machine language programmer typically use the .X register to index into small arrays. What is the largest byte-array size that can be handled in this way?

$15C In the mid-1980's, Commodore started manufacturing IBM clone PCs. One of the models had a name which was a type of horse. Name the term.

$15D What is the model number of the first mouse introduced for the Commodore 64?

$15E What was the problem with the mouse in question $15D?

$15F If you hold down the cursor key on the CBM 4000 series machine and it does not repeat, what fact about the machine do you now know (other than the key doesn't repeat)?

COMMODORE TRIVIA #18 ANSWERS

$120 The KIM-5 was the model number of the editor/assembler product.

$121 The basic unit contains 6 7-segment LED displays, or 42 LEDs if you count each LED in a segment.

$122 MOS 8726.

$123 The eraly versio of the chip (8726-R1) exists in DIP form, while the 8726-r4-r8 exists as a "J-lead" square surface mount unit.

$124 Instead of using the de-facto 9 pin D-subminuture connector for the joysticks, the Plus/4 series used small mini-DIN connectors. Some sources claim the older connectors were leaking a fair bit of radio interference and were preventing the units from attaining FCC approval, so the connectors were changed to the better-shielded mini-DIN types.

$125 The Commodore T-1341 Joystick, which had the special mini-DIN connector

$126 At last count, 3 models in the Plus/4 series were produced:

The Commodore Plus/4
The Commodore 16
The Commodore 116

Some Commodore 264 models are known to exist, but are not counted, since the 264 was the prototype model of the Plus/4. Also, a V364 model was planned, but only one unit is known to exist.

$127 The filename starts at the 4th byte in the directory entry.

$128 35 tracks.

$129 30 bytes.

$12A The Commodore 8250 or 8250LP dual disk drive.

$12B 1.025 megabytes.

$12C One one keyboard style, the Commodore graphics are printed on the front of the keys, while they appear above the letters on the keys in the second type of keyboard. I can't answer the extra credit part except to say that Commodore was always seeking the best deal. Maybe a new keyboard manufacturer got the bid and changed the layout.

$12D $6000 - $7fff is swapped out when a RAMDOS command is executing.

$12E The drive mechanisms differ in the two drives. You can tell which you have by the appearance of the front of the drive. If the lever hits a rest in the release position, you have the direct drive model. If the lever has no such rest visible, the drive cotains the belt drive mechanism.

$12F 4. red, black, blue, and green.

$130 Productivity.

$131 Case style and keyboard. The C16 is enclosed in a VIC20/C64 style case with keyboard, while the C116 sports a scaled down Plus/4 style case and "chicklet" keyboard.

$132) 50 pins.

$133) The left side. Since the disk drive fills the entire right side, the left side is an obvious choice, as the swith would require cabling if installed on the right side.

$134 92 keys.

$135 There is only one LED, a red in-use LED.

$136 True.

$137 1. True fact: In order to print a line of graphics, one must print a GFX char, do a return without linefeed (resets the graphic character, evidently), the tab over and repeat the cycle until 80 characters were printed. I had one, and it took me 7 hours to print 21 pages of geoWrite text!

$138 Secondary address #5.

$139 8 pins.

$13A 9 pins.

$13B go64. It will ask for confirmation.

$13C A word processor, spreadsheet, graphics software, and a data management program.

$13D The 1525, MPS 801, and MPS 803 had such a switch. Although I cannot confirm this, I believe the 1515, the precursor to the 1525, also had the 4/5 switch.

$13E There are 47 control registers in the Commodore VIC-II chip.

$13F PRESS PLAY AND RECORD ON TAPE #2

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enGEOyable Entertainment

by Bruce Thomas

It is something that I am sure almost everyone does with their computer. It happens to be one of the things the Commodore 64 is very good at. It is also the reason home computers keep developing into such powerful machines. In case you haven't guessed, the 'It' I am talking about is games.

While the Commodore 64 came loaded with features that allowed it to run fantastic game programs, it is, as any serious user knows, capable of doing amazing productivity work. Inexplicable as it may be, the superior (at the time) game features of the C-64 caused many people to dismiss it as not really being a serious computer.

Have you ever heard anyone say a 200 MHz computer with 3.0 GB Hard Drive, 64 MB RAM, 12X CD-ROM, 3-D video card and 16-bit sound card powering 60 Watt stereo speakers is not a serious computer? Of course not! That would be absurd.

While all of those little 'extras' may enhance the charts, graphs and color DTP the new machines can do, is it only coincidental that they also allow users to play some mind-blowing games? I think not! Games are a major driving force in the computer industry.

Recent issues of Commodore World have looked at productivity with GeoCalc, GeoFile and GEOS Disk Organization. In case you didn't know it, GEOS has some great games too! So sit back in your favorite chair with this article as we forget productivity for a while and look at some very enGEOyable programs.

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Pick a Card, Any Card...

The first game for GEOS was Berkeley's *BlackJack* Desk Accessory (D.A.) on the DeskPack Plus disk. I don't know if this set a trend or not but there are a lot of card games around. *Solo Poker* (Ken Turner), *Draw Poker* (Gary Reynolds) and *Poker Machine* (D.J. Sherren) are three very different versions of 5 card draw for GEOS. All of them make good use of the GEOS interface and graphics with the player going for a high score in 10 hands at once in the former, and betting on one hand at a time in the latter two.

GeoSolitaire (Paul Murdaugh) is a great version of this old-time favorite and can be found on the Landmark Series II disk from Parsec, Inc. Also on this disk is *Geo Drop* (previously geoTet) which is another familiar game. Both of these come in 40 and 80 column color versions.

Action Games

RUN Magazine produced 3 quality GEOS disks that are still available from Creative Micro Designs (CMD). The Power Pak I and II disks, plus GEOS Companion, feature 6 games between them including my sons' favorite on Power Pak II. In *ShootOut* (Wayne Dempsey) your objective is to shoot the bad guys (and not the good guys) in 3 different scenarios before they shoot you (easier with a mouse than a joystick!).

Compute!'s Gazette magazine couldn't let RUN grab all of the GEOS game fun and their arcade style D.A. *SKEET* (Roger Pingleton Jr.) appeared in the May '88 issue. This game is a fun way to shoot clay pigeons without the need for earplugs and shoulder rubdowns.

Sneaky Snake (John Chrisman) stars a bug eating, growing snake and is one of those games that appears deceptively simple at first. You will find yourself coming back to this one again and again though as you can customize it however you want. Options let you choose from 4 levels (a blank playfield to a complex maze), set the number of snakes (lives) you get and the speed (29 settings). The animation at the end of the game is well done also.

You must manuever 63 tiles on an 8*8 grid to maintain a path for your ship to travel on in *Lightship*. This 'moving maze' game is one of seven games written by Kent Smotherman and distributed by Parsec, Inc on their GEOS Games Disk. This collection of action/strategy games includes some very good adaptations of old favorites plus many with new twists (*geoStorm* is like Tetris but with tiles falling from 4 directions!).

While most of these games run under GEOS 128 in 40 column mode the first color game for the 80 column side of GEOS 128 was *geoInvaders* (William Coleman). This Space Invaders replica appeared in the October 1989 issue of RUN magazine as a type-in.

Brain Games

You can even learn with educational GEOS games. *StatesNCaps* (David Hall) is a D.A. that helps you improve your knowledge of State Capitals while *geoMath* (Richard Rardin) lets you work on the four basic math skills at 3 levels.

A popular game in the Windows world is Minesweeper and a fantastic C-64 PD version is available on the Internet. There is also a very good D.A. version for GEOS called *Hazard!* (Sean Huxter) that appeared on Loadstar #93. While only one level of play is available it is still challenging enough to be interesting and fun enough to make it the only game stuffed into my REU during bootup.

Another 'hidden object' game that I recently got off the Internet is *Parallax* (Red Storm - aka Joe Buckley). After clicking on the title screen you are presented with a 10*19 grid on which can be hidden from 3 to 9 'probes'. Using triangulation it is up to you to locate the probes in as few tries as possible. A high score list is maintained by the program.

Supermind (Sean Huxter) challenges players to find the hidden color pattern and is another game from the tower at Loadstar. This D.A. appeared on #96 and is similar in play, but graphically superior, to *Decode!* (Francis G. Kostella - FGK) from the RUN GEOS Companion Disk (Decode! has a cool soundtrack though).

Strategy Games

GeoWar (Lysle Shields) is a GEOS version of the board game RISK where up to 6 players (human or computer) take turns trying to conquer the world. The color display of the 'board' is very nicely done, as is the easy to use game interface.

Two other similar games, *Circe V1.3* and *Circe V2.0* (complete with Rotating Globe playing surface), appeared on Storm Disk 1 from Red Storm. I am trying to find a current source for this disk as I'm sure many users would like to get it (and not just for the games). In the meantime you can enjoy the PD *Circe V1.0* (all 3 by FGK).

Mah-Jong is a terrific version of the ancient Chinese tile game. Irv Cobb made his tiles from GEOS program Icons for a very appealling, and geoSpecific, look to this game (an 80 column color 128 version has recently been written that uses the 64K VDC). Gameplay is different, and requires fewer mouse presses, than *geoTile* (FGK) from Power Pak II which gives you the option of removing the tiles after choosing a pair.

Describing itself as 'another bloody control-the-universe strategy game' *Cluster Wars* (when did FGK sleep?) is very well done for the GEOS environment. All input is done with your chosen device as you guide your fleets of fighters, cruisers, destroyers and even Death Stars in a battle with the evil MECHS for control of planets *and* the universe. Since taking over the universe can be a time-consuming process you have the option of saving games in progress.

Orbs and Ends

GeoComix is a very interesting concept developed by Sean Huxter. This interactive comic book came with one 'story', called The Orb, that the user could control to determine the outcome. Whether more were ever made by Sean, or anyone else, I don't know but this one is a unique GEOS experience.

These next two aren't games but, by making them the last auto-execs on your boot disk, they will put a little enGEOyment into booting GEOS. First off is *AutoRAW* (William Jaeger Jr) which plays digitized .RAW format sound clips. My favorite is the voice of HAL, the computer, from 2001: A Space Odyssey ("I'm completely operational and all my circuits are functioning perfectly"). The second file is called *Fancy Start* (Anthony Sommers) and pops up a nicely colored, GEOS 2.0 title screen as a 3 second intro.

GEOS was designed to increase the productivity of the C-64 while providing a common, easy to use, interface. The designers obviously knew about 'all work and no play' so they wrote Blackjack. As with most things in the Commodore universe, the GEOS game component has developed far beyond anything originally foreseen, I'm sure.

What this all comes down to is a lot of mousing around! I now have over 50 games for GEOS that make use of the 64's great graphics and sound capabilities. Unfortunately, all of this enGEOyment could cause some people to, once again, doubt the serious computing power of our trusty C-64's.

Software Souces

For Power Pak I and II, GEOS Companion, DeskPack Plus, RUN Magazine (Oct. '89), ReRUN disk (Sept/Oct. '89) contact: Creative Micro Designs, P.O. Box 646, East Longmeadow, MA 01028-0646, USA, 1-800-638-3263.

For Loadstar Issues #93 and #96 contact: Loadstar, P.O. Box 30008, Shreveport, LA 71130-0008, USA, 1-800-594-3370.

For GEOS Games Disk or Landmark Series II disk contact: Parsec, Inc., P.O. Box 111, Salem, MA 01970-0111, USA.

For other games, check your local user group, online resources, or users who are selling their equipment.

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Commodore's Major Developer

Second
in a series
of three articles
by
K. Dale Sidebottom

I love to receive any Commodore magazine or newsletter. They always contain information that challenges and inspires me. One of my biggest surprises arrived with the Nov/Dec '95 issue [#11] of *Commodore World*. Inside was a "CMD/CW Market Survey." I found some of the questions particularly intriguing.

Consider question #18:

(a) If you were to buy another computer at this time, what computer platform would you consider most seriously?
A. MS-DOS B. Macintosh C. Amiga D. Other...(b)Why?

This is a touchy subject because it touches the fear that haunts us all. No matter how dedicated the user, the nagging thought persists that someday... due to an inability to stay current or a lack of parts... the Commodore will cease to exist as a viable platform. Everyone of us may be forced to move on to some other computer: MS-DOS, Mac, Amiga, or Other. But why does CMD want to know?

I perked up when I read question #23:

(a) Would you be interested in a new CMD computer if it had compatibility with existing Commodore software or hardware?

(b) What features would you deem to be most important and what specific compatibility level would you consider satisfactory?

(c) How much would you be willing to spend on such a computer without a monitor?

(d) Would you still be interested if it required you to purchase an SVGA monitor (approx. $200 to $300)?

If your mother-in-law asks if you want to replace the carpet in the family room, your first instinct is to think of it as an idle question. But if she continues to prod you, asking what texture and color you prefer, you begin think that maybe you'll soon be walking on a new carpet!

The SuperCPU can be a little TRICKY...
Even SCARY... But always a TREAT!

Question #23 struck me that way. Part (a) seemed like an idle question until I read (b), (c), and (d). Suddenly it began to sound like CMD might be serious.

On the other hand, we have been disappointed so often by the prospects of a new computer. Remember the C-65? It sounded too good to be true, and indeed it was! It felt like a cruel hoax to those who had taken the advance ads seriously.

Considering this, I decided to wait for the results of the survey before investigating further. I sort of poured the whole thing into a pot and pushed it on the back-burner to simmer awhile.

Meanwhile, CMD was busy developing the SuperCPU. There were many delays of course, and for months we waited and watched and wondered if it would ever *really* happen.

Maurice Randall is a good friend and a member of the Lansing Area Commodore Club (LACC). Reading their newsletter, the *Double Click*, I learned that he was demonstrating a SuperCPU prototype for his user group way back in May! It was obvious that CMD was getting "super-close" to a finished product.

My mind traveled back to 1990 and an article entitled, "Let's Go Faster," which first

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Author's Note

Mark Fellows created JiffyDOS and began to market it in 1986 as Fellows, Inc. The following year, he joined with Charles A. Christianson to found Creative Micro Designs, Inc. (CMD) in order to expand and to produce new products.

Commodore once referred to Commodore Business Machines, Inc. (CBM). Since they went bankrupt, the word "Commodore," as used in this article, never refers to the Commodore business. It always refers to the Commodore 64 and 128 in their various forms or to the community of Commodore enthusiasts throughout America and around the world.

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appeared in the Jan/Feb issue [#5] of *geoJOURNAL*. The author, Joe Tom Collins, believed that a faster processor for the Commodore was quite possible.

"Commodore (CBM) computers have had a few drawbacks for a long time. Slow drives with small storage, limited memory, and slow processing speed have all contributed to the perception that Commodores are 'toy' computers or 'game machines'...

"As the 64 pushes towards its tenth anniversary, we've seen a lot of yesteryear's problems start to fade. The Creative Micro Designs' (CMD) product, JiffyDOS, as well as other products have speeded up the drive access. Commodore, in some of its brightest decisions, made the 1571 and 1581 disk drives...and CMD is now producing a full- fledged set of hard disk drives with the SCSI standard used in almost every computer... CMD is also making a RAM expansion unit [the RAMLink] *offering... as much as 16 megabytes in the not so far distant future.*

"This brings us to the last big inadequacy of the Commodore 8-bit line... processor speed."

Here he demonstrated how thoroughly he had done his homework. He explained that the Commodore and Apple computers are distant cousins. They all use the same type of processor. Zip Technologies had created speed-up chips for the Apple computer. There was no reason why it couldn't work for us too!

So he called up the Commodore support line and the technicians said it should be possible, but that their marketing people said "speed was not a big issue with the Commodore users." Well, he was incensed and no wonder! We know why CBM thought that a speed chip was unnecessary, and it had nothing to do our desires. CBM's marketing department was already unhappy because so many Commodore users were not switching to the Amiga! The last thing they needed was a faster processor to make the C-64 even more attractive.

At the time, I was editor of the *LUCKY LINE*, then newsletter of the LUCKY user group. I loved his article so much that I made it the main feature of our Summer '90 issue. The graphic (below) was designed for the cover. The big movie on the marquee back then was "Days of Thunder," starring Tom Cruise. Tom played a race car driver named Cole, and Rowdy was his main competitor. This cover expressed as best I could the frustration we felt, knowing that we were being held back and not allowed to compete on a more equal footing.

Joe Tom Collins spoke of Commodore "drawbacks," such as the slow drives, small storage, and limited memory. He then explained that CMD had solutions to all of them except the last and, perhaps, the most challenging... a slow processor. Now, nearly seven years after he pleaded seemingly in vain for more speed, Joe Tom Collins has what he lobbied for. I hope that he is around to enjoy a well-deserved victory!

It occurred to me that the SuperCPU represents the greatest technological advance in the Commodore since the Commodore 64 and 128! The developers of this kind of hardware could produce anything!

Problem: When a company has done everything it can do in a particular field, it soon develops itchy feet! I certainly did not want CMD to move on to other markets, but what could they possibly do for an encore!

Suddenly, I realized that my pot was boiling. I pulled it off the back-burner and opened it up to rediscover that CMD/CW survey! No longer able to contain my curiosity, I called CMD and talked to its co-founder, Charlie Christianson.

Dale: "You sent out a survey at the end of 1995. What were the results?"

Charlie: "We have entered the data in our computer, but we haven't really had time yet to analyze the results. The SuperCPU has complete priority right now."

D: "Question 18 of your survey asked about other platforms. Do you remember which were the most popular?"

C: "Yes, about 50% chose MS-DOS, 30% for Macintosh, 15% for Amiga, and 5% other."

D: "What about question #23? Have you seriously considered introducing a new Commodore-compatible computer?"

C: "It is a possibility, but nothing is imminent."

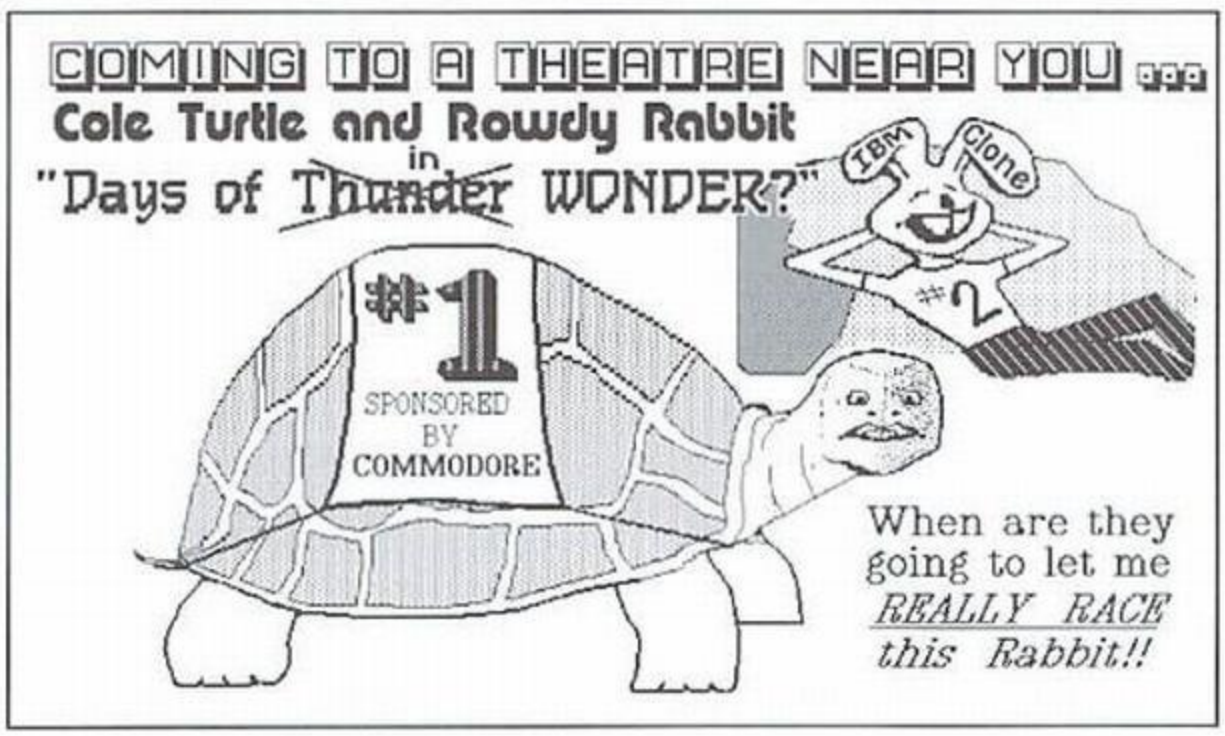
D: "Because MS-DOS was the most popular alternative, would this new computer have two modes; one a C-64 and the other, MS-DOS?"

C: "No, we have no intention of producing MS-DOS. MS-DOS has, in effect, taken the "home" out of the home computer market. Almost everything purchased today is a mid- to high-end business machine. It will generally cost $1000 to purchase it and another $1000 for the software if you buy it legally. You've invested over $2000 [*to balance your checkbook, follow investments, help the kids with their homework, and surf the internet*]. That kind of cost is out of line for most families!

D: "What kind of computer does CMD envision?"

C: "We plan to use the same 65816 processor now used in the SuperCPU, except that this would be a whole new computer! It would have two modes: the C64-mode (8-bit processing) and CMD Native-mode (16-bit processing). It would be designed to work with a TV or an SVGA monitor and could be used with all the modern peripherals, such as CD-ROM devices. We hope to be able to sell this new home computer for about three hundred dollars, probably $299."

D: "How far has CMD gotten in the planning process?"



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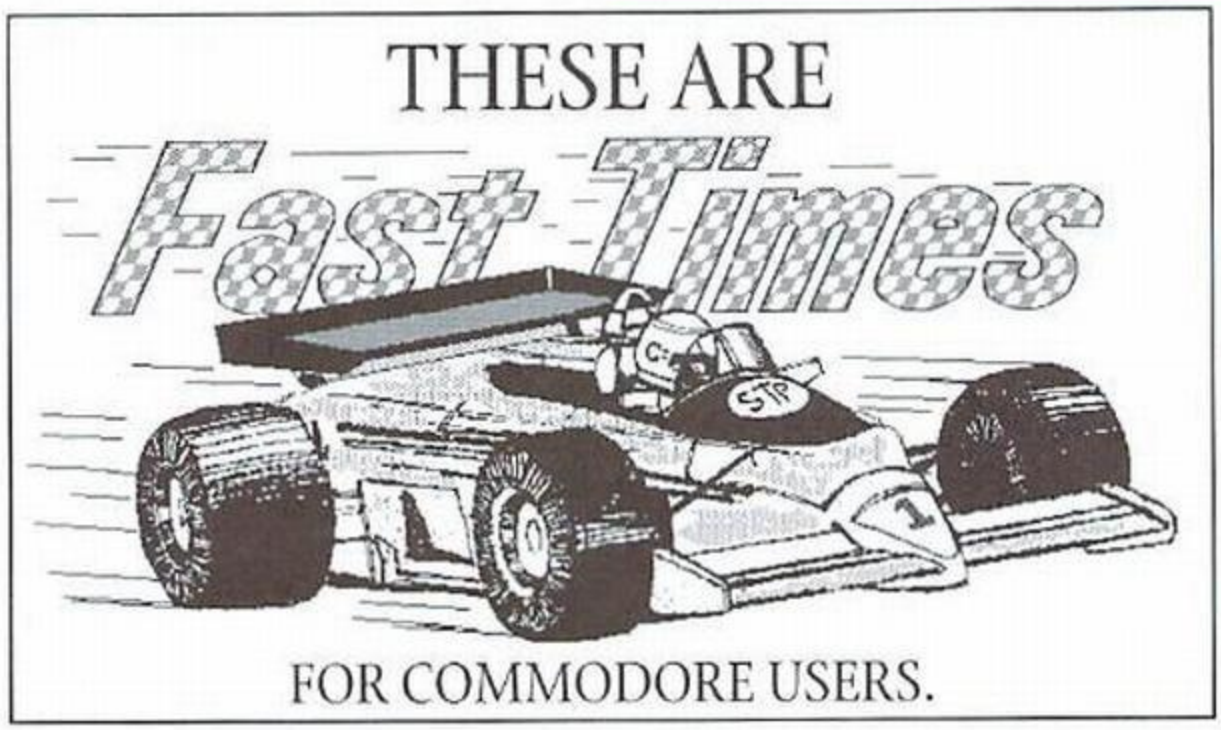

C: "We are just starting. CMD has a hard conceptual design and the beginnings of a prototype. We are entertaining discussions with venture capitalists to gauge their interest in the possibility of producing such a machine. As I said, nothing is imminent. We are at least 2 years and millions of dollars away from an actual product!"

He also explained that the 65816 processor was used in the Apple IIGS. Through the internet, CMD has already received inquiries from people who programmed for that computer and would like to program for us!

It is dangerous to dwell in "Never-Never Land," in part because we have been disappointed there in the past. Remember, CMD's new computer isn't even out of the incubator! But if we can maintain reality and still enjoy dreaming, imagine the implications! How would it feel to find your faith in Commodore validated by a new computer? How would it feel to see magazines on the shelf again extolling the virtues of *your* platform?

Returning "to earth," we must realize that such "pie-in-the-sky" possibilities are years from fruition. Still, as Patrick Henry once asked, "Why stand we here idle?" Aren't there some steps we could be taking to make this dream a reality? I believe the answer is "YES!" Let's start with these.

The first thing we can to do help them is DO NOT CALL! When I asked to report this to you, CMD's greatest concern was that they would be flooded with calls asking for details they would be unable to provide. It is too early to know what the future holds. Certainly we should be getting some kind of progress report in *CW* before long, but CMD has its hands full for now finishing the SuperCPU for the 128. I assured them that we would respect their request. Please help me keep that promise.

Second, we must work to maintain market share. We need to continue to strengthen our user groups. In the Oct. '96 issue [#16] of *CW*, Jayme Rice, president of the Tampa Commodore Users Group (TCUG), suggested five ways to increase our membership. They were all very good, and I recommend them to you. The one that I felt should be added to the list was to emphasize the importance of recent retirees. In the LUCKY club, we find that several of our newest and most active members come from this group. They have much wisdom, vitality, and a deep respect for those things that have proven their character over time.

Another way to maintain market share is to increase our use of the internet. Whenever a user group fails, there are often faithful Commodore users left stranded and "alone." The internet provides a way for us to maintain close contact over long distances.

That is why the LUCKY club has elected to create an internet "phone book" of Commodore users. So if you are "connected," please send us your internet address and your name, if you choose to share it. Optional information includes your home town and areas of special interest. Email your data to the club or to me. More information will be given later.

The third thing we must do is to maintain our balance! If we never see a next-generation computer, are we going to quit? I hope we will continue to enjoy what we already have! Today we have the best hardware and software that Commodore users have ever known! Never has there been a better time to own a Commodore! We need to enjoy what we have and, yet, seek to expand upon it.

To expand, we need to invest. If you want CMD to build your next computer, take full advantage of the one you have now by following the suggestions that Joe Tom Collins made over six years ago. Achieve (1) faster disk access, (2) greater disk storage, (3) more memory, and (4) much faster processing speed by turning your "toy" into a "mean, supreme computing machine!" These products are available from CMD.

By the way, it just occurred to me that there may be one exception to CMD's "don't call" request. If you are lucky enough to own millions of dollars and are intrigued by the concept of venture capital... if under these circumstances you want to know more about their nothing-is-imminent, pie-in-the-sky, next-generation, Commodore-compatible, DYNAMITE! in the home computer... why not give them a call. I suspect they'll be glad to get it!

Some users balk at investing a couple hundred dollars upgrading their Commodores. Why? Don't miss the final installment, Part 3 of this series, where we'll discuss CMD and *Cautious Market Decisions*.

Write to Creative Micro Designs (CMD) at P. O. Box 646, East Longmeadow MA 01028, or call them at 1-800-638-3263.

The Lansing Area Commodore Club (LACC), P. O. Box 1065, East Lansing MI 48826. The club newsletter, the Double Click, is edited by Maurice Randall. Maurice also has a BBS called the Speed Zone. If you to want visit there, call 1-517-322-2386.

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Just For Starters

by Jason Compton

A POTPOURRI OF COMMODORE-FLAVORED ADVICE

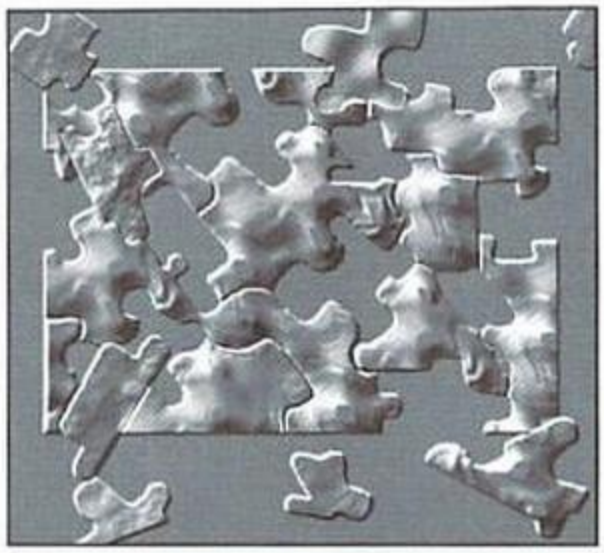
Rather than focusing on any single theme as the summer boils on, I thought now would be a good time to catch up on a number of different things you might be interested in doing for your Commodore system.

Low-Cost Organization

It's so easy to misplace disks, tangle cords, etc. that we seem to do it almost by instinct. There are ways to get around our natural inclinations, however.

Label Disks: This sounds so silly and basic as to almost defy explanation, doesn't it? Yet laziness is a bad habit and it's so much easier to develop than good habits are. And in this day and age, where you might find yourself buying floppies in bulk or second hand without labels, it's even easier to neglect to label your disks. The problem here is that you play "Where's the disk with the torn label and the slight discoloration on the sleeve?" for minutes at a time when you could have just pulled up the game or the paper you were working on had you known where it was.

The easiest and cheapest way to go about this is to head to your local office supply store, Wal-Mart, or supermarket, grab a package of white labels and a good quality non-ballpoint pen (I recommend Sharpies), and head for home. You get hundreds of labels for cheap, you've got a pen you can comfortably write even on 1541 floppies with (3.5 inch disks are generally safe to use ballpoint on because of their sturdier shells), and, provided you put out a bit of effort, you can keep track of your programs. *Cost: easily under $5.00.*



If you've got a printer, you may want to do what a friend of mine has done successfully for years and use it to print a narrow-font readout of your disk directory, and stick that slip of paper in the disk sleeve where you can easily pull it out to survey what's on that disk. *Cost: well, if you've got the printer already, the paper and ink use per directory is insignificant. (Incidentally, do as I say and not as I do. I am the world's worst labeler and have lost numerous packages of labels friends have bought me just so I would do exactly what I'm telling you to. Only a very, very reliable memory which really does keep track of what scribbles and tears and colors mean keeps me going.)*

Port Splitter: The Commodore machines have two joystick ports, and if you're just playing games it's fine to just leave them plugged in all the time. But if you do anything that requires a mouse, trackball, or touchpad, you may get frustrated having to swap cables all the time. (And it is, incidentally, a good idea to turn the computer off when swapping devices in the joystick ports. Those ports are fairly static sensitive, and you wouldn't want to have to send your machine in for repair just because you forgot to turn it off.) There's another way, however. You can get port splitter cables which plug into the joystick port and branch off into two separate plugs. It won't do anything for the amount of devices you can use at once (in other words, you still can't play a game with three joysticks), but it can save you from hassling with the mouse every time you want to use GEOS. *Cost: I've purchased a handful for 25 cents each. If you can't find one, at the very least, please turn off your machine when swapping devices, and try to have both ports occupied at all times, particularly if you're a 128 user who could zap one with your hand while reaching for the reset button. Cable splitters are not recommended for lightpen use because of their constant input to the machine.*

Cable Ties: If you've got a basic CPU/floppy/monitor setup, your desk probably isn't too cluttered. But add another floppy, a printer and printer interface, and a moden and pretty soon you've got cords snaking all over the place. You'd be surprised what a few cable ties can do. You can always get the cheapie "lock once, cut off later" zip-ties, but I recommend the classier and easier to use velcro wraps you can get at office stores or through catalogs. They're reusable and don't punish mistakes, and come in a variety of lengths and colors. Having all of your power cords bundled and off to one side and the serial cables makes a big difference in how your desk looks, and if your desk isn't cluttered to begin with you might be more inclined to keep it clean. *Cost: under $5.00.*

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Dealing With Archives

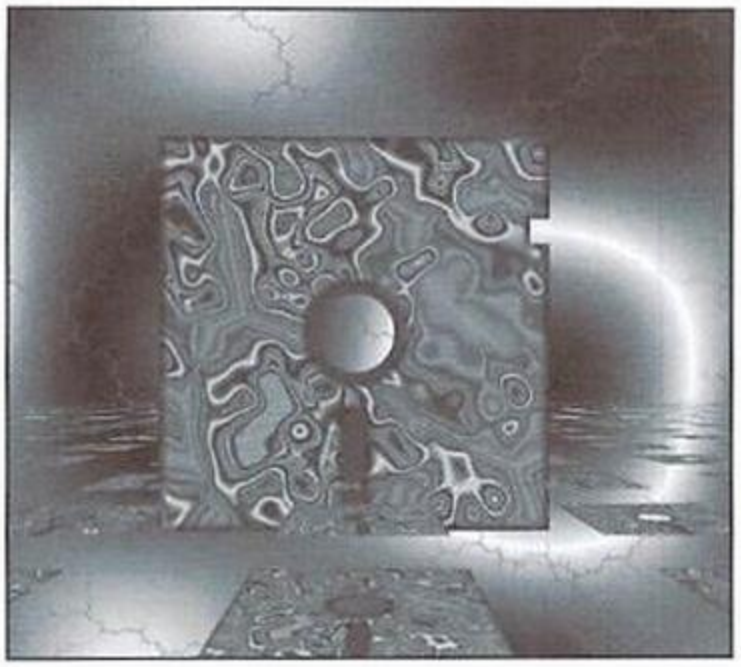
If you get into the world of Commodore online, whether it be through a local BBS, an online service like GEnie or Delphi, or through the Internet, you're bound to want to partake in the myriad of useful programs out there. But the number of files you can download straight to disk and run is fairly small. Most of the files you'll encounter will be in some form of archive. Archives are designed to either compress files to a smaller size, link multiple files together into one, or store an entire disk as a small collection of files. An overview of the formats you're likely to encounter and the programs you'll want to use on them will be helpful in the long run.

Lynx: One of the most popular Commodore-specific formats for linking multiple files into a single archive, Lynx is very clever in that it can create an archive of any number of files on a single floppy without disk swapping. It manages this by linking all of the files directly into the Lynx archive. This means that if you have 600 blocks of files to archive, you just need to have them on their own disk and Lynx will perform the conversion without needing to resort to a "destination" disk. Lynx is a true "archiver" in that it doesn't actually shrink the size of the files at all, it merely stores them.

Lynx files typically have the suffix ".lnx". Lynx was originally written by Will Corley, who maintained the "official" versions of the Lynx archiver and de-archiver through Lynx 17. Others programmers have created Lynx 'clones' like Ultimate Lynx and Lynx 2001. Some of these are unreliable for creating lynx archives, so it's recommended that you use Lynx 17 for creating and dissolving Lynxes whenever possible.

Zip-Code: Also known as Zip, but not to be confused with PKware's PKZip and it's derivatives, common on other computer platforms. Zip-Code on the 64 is a whole-disk archiver. It takes an entire 1541 floppy and converts it to four files, almost always with the prefix "1!", "2!", "3!", and "4!" (there's also a 'Six-Pack' version that creates six files). Zip-Code is often used when Lynx is ineffective (if data from a floppy is needed but is not associated with a standard file). You may occasionally find Zip-Code files buried inside other archives, such as Lynx, to make downloading more convenient. Individual BBS systems and online services may have rules about this—most of the BBS systems that I frequented found it very inefficient and annoying to have to run Lynx, THEN Zip-Code. Zip-Code does not provide any compression, except on sectors of the disk which are totally unused. (For this reason, if you are creating a Zip-Code archive, it's best to start with a fully formatted disk before placing the data to be Zip-Coded on it.)

Zip-Code requires you to have a source and destination disk—almost invariably a 1541, although you can theoretically read Zip-Coded files from any standard device. You can use a single floppy and swap disks when prompted, but having a second drive of some sort is very convenient. Zip-Code has been packaged in a variety of ways over the years. You can often find programs to create or dissolve Zip-Code archives as stand-alones, but there have been Zip-Code packages with menus for both functions as well.



Arc: Though still popular in some circles, Arc in its base form isn't used much, mostly due to a lack of a freeware menu-driven version. Files tend to have the suffix .arc and are compressed. You'll need the Arc program for the 64 or the CS-DOS and Arc128 programs for the 128 (all owned and distributed by Parsec) to dissolve them.

Self-Dissolving Archives and **Self-Extracting Archives:** These are the archives that will make you smile. No outside program is required, all you have to do is load and run the program you download and it will do the rest. These typically come in two varieties, .sfx (for self-extracting LHA) and .sda (self-dissolving arc), but the differences as far as you're concerned are unimportant. You may or may not have to use some sort of destination disk or device, depending on how the archive was created. Both of these archive formats provide compression and eliminate the need for any external utility. Self-extracting archives are sometimes, but not always, self-destructive (in that they will erase themselves in favor of the new unarchived program when finished).

Omega-Q: This is a program which deserves special mention. Omega-Q, distributed by Q-Link when they were in operation, is a very easy to use disk utility program which serves a number of functions, including the ability to extract both Lynx and Arc archives. While it can't be legally distributed anymore, you may have it in your collection if you were a member of Q-Link.

Summer Shopping

If you find that you have a little disposable income and you want to invest in your Commodore system, here's a short shopping list to fit any budget of the sorts of things you might want to consider. I could go on for days as the amount of 64 product out there is truly staggering, but that's what happens with you have a computer that's 15 years old and going strong.

Some of the things you can buy are still new products, which means you can get them from reputable dealers (you'll find several who advertise in this publication).

There's also the issue of used merchandise. It's certainly out there—just look in the "for sale" section of a major newspaper, in your local BBS online forsale groups and on the Usenet newsgroup *comp.sys.cbm*. There are even online auction services which have recognized such a demand that they have separate sections for Commodore 8-bit sales. Some great deals can be had and there are many things available used which can't be purchased new. Still, when buying used items there's no guarantee of continued performance, often no recourse, typically no support, and there are some dishonest folks out there. Be aware of these things when choosing what you want and how to purchase.

Items Under $20

Books on Commodore programming. There's really no equal for the experience of making the machine do what you tell it to. CMD and other dealers carry a variety of programming books. You can even sometimes find them at libraries—don't be afraid to check!

Back issues of magazines. CMD can provide you with Commodore World and RUN issues, but

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there are a slew of people out there who are dying to clear shelf space. There's a lot of interesting things in those old magazines—good advice is good advice throughout time.

Distressed equipment. You can sometimes find used 64s and 1541s at the sub-$20 level, but it's probably not going to be top quality used merchandise. Expect missing or non-functional keys, read errors with drives, and the like. On the other hand, some of the parts are probably good, and might come in handy some day.

A Loadstar Compleat series. Most of these are under $20, and are disks full of quality software.

Games. The games you can find new are almost all under $20. Treat yourself to some fun!

Joysticks. Stock up, because the CMD GamePad is virtually the only Commodore-ready joystick currently being manufactured. Used joysticks aren't always a good idea, since they're prone to wear quickly.

$20-$50

Decently functional used hardware. The 64s, 128s, 1541 and 1571s you'll find used for this price are probably someone's former pride and joy, so while they might have taken good care of them, they're still used. Sometimes you get lucky and they were owned by meticulous computer scientists who kept them under dust covers 100% of the time they weren't in use, other times they'll be a bit more seasoned. Typically, original "breadbox" 64s are cheapest, followed by 64Cs, 128s, and 128Ds. 128Ds are in fact likely to be more than $50, in part due to the built-in 1571 and in part due to their relative rarity and the detached keyboard.

A programming language or compiler. This may go well with that programming book you picked up. Most of the still-sold compilers fall into this price category. On the cheap, you can check out the freeware Turbo Assembler.

1581 Disk Drives. A special note for this underrated drive is important here. Most will clock in on the higher end of the price spectrum, but you should try to pick one up if you can. Having 3200 blocks at your disposal (about 5 times a 1541's storage capacity) is invaluable for a number of uses. You'll also find buying disks much easier, and it will make life easier for software publishers who are themselves having a tough time finding 5.25-inch media. A 1581 will really open your Commodore horizons.

GEOS. It may take a little bit of growing on you, but GEOS really is a very useful piece of software, with a software library that you'll be very impressed with if you give it a chance. Most of the commercial GEOS applications are in this price range, too.

Turbo232. If you've been using a 2400 baud (or slower) modem on your Commodore for years, it's so liberating to break loose at higher speeds. In the same price bracket you can probably find a used 14.4k modem, too.

JiffyDOS. The ultimate in all-around disk drive enhancement, you can get the base system (computer and single drive) for this price level. JiffyDOS is like a drug—once you get some, you want more, and soon you'll want to equip all of your drives with it.

Used printers and printer interfaces. A used Commodore-compatible or standard centronics printer can be found for as little as $20-25, though it may not produce very good quality. Better models and those in really good shape may fetch a bit more. A fairly good used printer interface can also be had in this price range.

$50-$75

Used RAM expansion. Some hardware is rather difficult to find used because it wasn't extremely widespread, or because it's hoarded by owners. If you can find a used REU, it'll probably be somewhere around this price, or possibly less. Commodore REUs are not as power- or space-efficient as their more modern counterparts, but they are out there.

Used monitors. Finding new or refurbished Commodore-ready monitors can be difficult, and the Commodore monitors were so good and are still are so desired by video professionals and other computer users that they tend not to be cheap. This may even fall into the next range.

$75-$125

Complete used Commodore systems from motivated sellers. It's not uncommon to find someone with a complete system (machine, disk drive, and monitor) who will let you have everything for this much, provided you pay the shipping or drive over and take it away. Typically, they've had their fill and just want it out of the house. Often you'll get other goodies—joysticks, software, and the like.

Refurbished computers and disk drives start around this price, with 64s, 64Cs, and 1541s and 1571s in this category. CMD remanufactures machines with JiffyDOS and you're guaranteed to have a quality product delivered to you.

New C64 computers and 1541 disk drives also start in this price range, though you won't get them with JiffyDOS installed for this amount.

A new REU. These are now made by CMD, and are fully compatible with Commodore REU software. Turbocharge GEOS or other REU-aware programs to make your work more efficient.

Used 28.8k modems. With new 56k models coming out, you can pick up a 28.8 in this range now. A few low-cost brands even make models which sell new very near this neighborhood. If you've got a Turbo232, take note.

$125-$175

An FD-2000. The ultimate answer in floppy storage, allowing you access to 1.6 megs on a high-density 3.5-inch disk, with the speed and power of JiffyDOS.

Complete used 128D or SX-64 systems. These are relatively more rare and sought after, and typically fetch a higher price.

$175 and up

New Printers. Picking up a brand new printer if you've got a very old one (or none at all!) can do wonders for your system. Stick with a 9-pin if you use a lot of old software that prints graphics; but for GEOS or text-based word processing you'll want to consider a 24-pin or ink-jet model.

A SuperCPU. I've owned one for a few months now and can attest to how completely different it makes the experience of using a Commodore.

A RAMLink. While a base RAMLink costs even less, the really useful versions with some RAM installed start here. This RAM device acts like an ultra-fast hard drive, allowing you to partition it into various configurations. You also get an interface for REUs which allows you to use their memory more efficiently.

A CMD HD. Hard drives open up an entirely new dimension in rapid access and mass storage of your files.

Keep an eye out for cool deals, and keep your Commodores warm!

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Graphic Interpretation

by Paul Sullivan

CROSS-PLATFORM TRANSFERS WITH GEOS FILES

It was a blustery March afternoon when my wife Diana said she needed to pick up some merchandise at Lechmere. "Good idea," I thought. "While we're there, I'll check out the computer software department." Just a week earlier, it seemed that there had been perhaps one or two packages of Word for Windows 97 upgrade on the shelves. Now the bright yellow and white boxes of the entire Office 97 upgrade filled an entire aisle. I was just getting comfortable with using Office 95 Professional at work, and now here is another upgrade I will probably need to soon learn. And what will come after Windows 97? Windows 2000 for the new millennia?? Honestly, these Windows upgrades and their ever-increasing capabilities could drive any Commodore user to throw their hands up in despair and say, "I give up!"

Hold on! You just need some air. In this issue, I hope to let in a refreshing breeze for the devoted GEOS user by opening the Windows. 95, that is.

Several issues ago, Doug Cotton wrote an article that discussed how to perform cross-platform file transfers. RUN magazine also talked about this in its Oct. 1991 edition in the article "Share And Share Alike" by Tim Walsh. For all the hype made about this liberating procedure, however, (RUN's front cover shows colorful disks labeled MS-DOS,

Commodore and MAC) some authors seem to feel compelled to temper the reader's hopes with the obvious: "PC compatibility with the C-64/128 is a myth." I read up a little about Mount Olympus and its fictitious inhabitants when I was a boy, and I don't recall Zeus ever saying that. Seriously, though this hardware and software incompatibility is a fact, let's focus on the positive here-you can transfer files between the two platforms, so don't "myth" the potential. I will give you my own personal situation that necessitated shifting Commodore GEOS files to another platform.

Back in 1990 I purchased my first C-64. I was still to attend college for another two years, and as you can imagine, four semesters worth of essays really filled up the disk space. But that's not all; shortly after I graduated, I met my wife. She was to be away at school for yet another two years+ a school that was over 100 miles away from where I lived, thus our letters of correspondence are all in geoWrite format. The list goes on: my sister wrote a tribute to our late Dad, and I had also composed a great cover letter. Recently I wanted to take some of these valued documents and print them up on the new LaserJet at the office. The problem is, work uses the Microsoft Office applications on Windows 95. Therefore, my geoWrite files must be transferred from GEOS to MS-DOS format. After reviewing World #15, I realized two things: text files are the file type that most often need to be transferred between word processors, and such transfers occur most often between computers in different locations. You CAN use various means to perform the transfer; for this article, we will look at how to swap files using special applications called "conversion programs."

The Commodore hardware requirements for file conversion are basic: a C-64/128 with a 1581 or FD 3.5" disk drive. 1541s can be used, but such 5.25" disk drives are becoming rare. The more intricate your system is, the better. For example, two 3.5" drives will eliminate disk-swapping, and a

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1750 RAM expansion unit or RAMLink will aid the process because the RAM units will serve as large file buffers. The Commodore software requirements, in addition to GEOS 2.0, include Wrong is Write by Red Storm (copyright 1988) which converts geoWrite files to and from petASCII or true ASCII. Convert 2.5 can also do this conversion, but seems useful only if you want files to go from GEOS to Windows and not vice versa. The other needed software tool is Michael Miller's "Big Blue Reader," (hereinafter referred to as "BBR") available through CMD for $49.95. This program gives your system the amazing ability to both read and write MS-DOS disks, and is the key to successful platform-crossing. It must be noted here that this article is not a replacement for user documentation. Mr. Michael Miller, creator of BBR, included a thorough 20 page manual with it. To properly use the program, read it carefully before attempting to transfer any files. BBR is as intricate as it is powerful—knowing its various functions prior to file transferal will keep the procedure very smooth.

The destination platform was Windows 95 on a Compaq Presario 4716. The target was the application Word 7.0. The easiest steps that I found to go between the two went like this:

1. Prepare your work by backing up the files. Copy them to a source disk that you won't mind losing in the unlikely event that the transfer becomes hostile. Once this is done, convert them to SEQ format using Convert 2.5 or Wrong is Write.

2. Big Blue Reader CAN format MS-DOS disks, but for whatever reason my office's Presario could not read it as such. Instead I formatted a DD (double density, as opposed to a high density or HD) disk right on the Presario, and labeled it the destination disk. Windows 95 gives the option in its format command to format a 720 K disk. This guaranteed that the Presario would be able to read it once my selected geoWrite files were placed on it.

3. I loaded BBR from the 1541 and did the transfer of the files between two 1581s. If you have only one 3.5" drive you can still do the transfer, but be patient—depending on the size of the files, transfer can take several minutes and several disk swaps. Having two eliminates all need for swapping. Once loaded, I selected 1 for normal ASCII translation. Then follow any other screen prompts to your own preferences, and choose your source and destination (input and output) drives. Once this is set, the source disk can be placed into the source 1581. Load the disk's directory using BBR's "LOAD Commodore directory" function, and once it displays, highlight the files you want and select "COPY."

This handy procedure can be likened to the wardrobe that a traveler takes with him on a trip. Let's assume that the traveler is very neat, and that all of the clothes are nicely stored in a bedroom closet. The time comes for a trip, though, and the clothes must be tightly folded and put into a suitcase. Upon arrival at the given destination, it will be very likely that those clothes will need an iron. It will be likewise with all of the files that you transfer-when you take them out of the suitcase of the destination disk, you will need to do some ironing. What is nice about changing platforms from GEOS to Windows/MS-DOS is that Word 7.0 has within it just about every tool needed to quickly and easily fix up your document. Among these are a spellchecker, keyboard shortcuts for fast page/document formatting, and even menu options to change letter cases from capitals to and from lower case. Revise your document, and let the LaserJet print your transferred Commodore files!

Reversing the direction of the cross-platform file transfer—going from Word 7.0 on Windows to geoWrite on GEOS—is also pretty straightforward. The key I found is to also make use of Microsoft Works' simpler word processor called "WordPad." Under Word 7.0's EDIT option, click "select all," then "copy" the document while it is highlighted. Next, open WordPad, and paste the text from the document you just copied from. Now, select "save as" under the File option. In the dialog box that appears, give the file a simple but memorable name, and under "save as type" choose "Text Document- MS-DOS format." This particular format changes fewer characters in the transfer process. Run BBR's transfer process by selecting "get MS-DOS directory" and follow the screen prompts. Once you are finished, use the GEOS application "Wrong is Write" to convert the file(s) from petASCII to your version of geoWrite. At this point, remember, you will again need to use your "iron" to fix up the file's wrinkles.

I must reiterate that CW #14 and 15 show other methods of cross-platform file transfers; yet these tools, Big Blue Reader and Wrong is Write, will definitely help any devoted GEOS user to begin opening the Windows (pun intended)!

Questions? Comments? Topic ideas? If you have Internet Email access feel free to drop me line at *paul@cmdweb.com*.

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DemoMania

by Sherry Freedline

1996—THE BEST OF THE BEST

I'd like to dedicate this column to the memory of a dear friend and fellow Commodore Demo Enthusiast; John (Waveform) Kaiser, who passed away on Wednesday, April 23rd, 1997. John was well known within the demo scene for his excellent coding skills, as well as for his eagerness to lend a helping hand to so-called "newbies" by sharing his vast knowledge. May he rest in peace and may his memories and spirit live on eternally.

This year is starting out to be as equally exciting as 1996. Remember last year's 4k NTSC Competition? Well this year's surprise demo endeavor will be known to the Commodore Community as the NTSC Co-op 1997. What a treat it will be for demo enthusiasts! The idea originated within the first couple weeks of January. Here's the scoop...

Individuals wishing to contribute to the Co-op demo sent an Email to the Co-op "Captain", Natas/Carcass+Chromance. The Email needed to include their handle, the area they'd like to specialize in (art, code, or music), and the number of times they wish to perform each specialty. From these Emails, on Feb. 27th, eight teams were compiled consisting of a coder, graphic artist, and a musician. Each team then has until April 15, 1997 to submit their page. Pages are to be 100% original. The demo will be on one 1541 disk side and load with a menu/loader system designed by Crossbow of Crest. Then, on May 20, 1997 in the Thursday night NTSC Demo Conference (IRC channel #c64ntsc at 9 PM Eastern), the NTSC Co-op 1997 Demo will be released to the public. I bet that will be one busy IRC night! Be sure to have a spare 1541 disk side ready and waiting for this special release!

Rumor also has it that there will be another 4k NTSC demo contest after the NTSC Co-op 1997 subsides. Both of these events are great ideas and will help bring activity to the scene. If both of these events come to fruition, 1997 will definitely be a livelier year than 1996.

So far this year there has been a total of five releases (see the sidebar for more details). I imagine that since a lot of the demo artists are hard at work on their respective NTSC Co-op pages, that the Co-op, not to mention the impending NTSC Compo, may detract from the number of new releases. When bringing this point up at a recent NTSC conference, I was reminded that it's the quality, not the quantity that's important. We'll just have to wait and see.

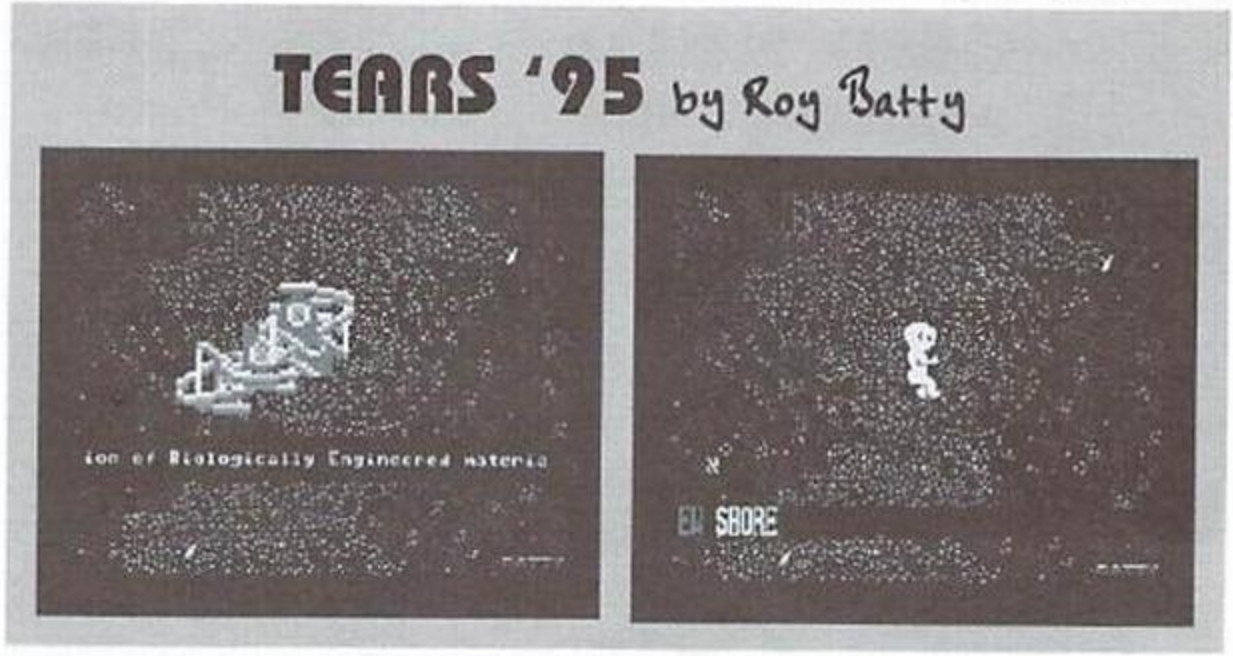
Well let's get started on this month's reviews. Back in 1995, Roy Batty (Terry Flynn) took the demo world by storm with his release of Tears '95. Tears '95 was the first demo to be released (that I know of) with a powerful message to pass along to it's viewers. It focuses on the biological engineering of human beings. Now Roy's back again with yet another wake up call, that of the words of Nostradamus. Even if you feel you might be spooked by the thoughts of Roy Batty, both of these demos are a must-see in my book.

Tears '95

by Roy Batty

Tears '95 is the first demo I can recall that focuses on a theme from the first to last page, and a very serious theme at that. With recent events introducing the world to the first ever successful clones within the animal world, you may say Roy Batty has definitely hit home.

Tears '95 begins with the TEARS 3-D style logo. The logo then rotates around the scrolling text of the demo, again in a 3-D fashion. The theme is then introduced by raising the question,



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"If a human Being is genetically created by another human being, does the creator have the right to possess his creation?" In the meantime, behind all this thought-provoking text, an original Roy Batty musical piece is played in the background. After RBI speaks his mind you are instructed to proceed by pressing the space bar. Doing so explodes the letters of Tears to the upper and bottom portions of your screen, leaving the middle section clear for an animated eye which actually cries one single tear.

Part two displays a starry sky, soon containing a DNA strand. Here I found the text so interesting that I almost didn't glance up to see the action taking place above the scroll. The DNA eventually evolves into Chromosomes, and finally a human baby appears in the middle of the screen. The scroll on the second page discussing the fact that US Government regulations state that "any creatures created by mankind CAN be patented". Roy Batty then raises the question of what can and cannot be considered human?

The final page displays a hand releasing a dove. The dove flies across the screen and a landscape appears. This screen contains some concluding text and the all important demo greets.

Everything in the Tears '95 demo was created by Roy Batty. Pretty amazing. The only glitch I could find were some dancing pixels in the lower right hand corner on the final page. However, considering the immense topic of this demo, they are easily overlooked.

In conclusion, all I can really say, keeping in mind the recent announcement of the successful animal clones, is wow! The graphics and music of Tears '95 are good, but you can really see in improvement in Roy's style with Tears '97. In the meantime, I've enjoyed watching Roy Batty evolve into one of today's fantastic demo artisans. Thanks for your contributions Roy!

Tears '97
by Roy Batty

Tears '97: The Prophecy is was released on March 1st, 1997. Once I heard there was going to be a new Tears demo, I was quite eager to receive it knowing full well the quality of all of Roy Batty's past releases, such as Millenium. And, just to add to the excitement of a new release, was the reminder of how stimulating Tears '95 had been.

If Tears '95 was the last work of Roy Batty you've viewed over these years, it won't take long to notice how much his talents have increased. As in Tears '95, Tears '97 also has one central focus: the Quatrains of Michel de Nostradamus. Just in case you're unfamiliar with these "Quatrains"; a quatrain is four lines of verse. In Nostradamus, case, these four lines all relate to his visions of the future.

The demo starts out with a title screen which fades away to reveal two eyes situated above one of Nostradamus' quatrains. This screen then quickly moves into the next page which is where the majority of the action takes place. This third screen contains a Tears '97 Logo nestled within another sparkling starry sky. I have to admit this starry sky is much better than the one contained in Tears '95. Here is also where you'll experience the thoughts of Roy Batty, with a scroll focused on the Nostradamus Quatrains. He speaks of an increase of floods, famine, disease and other natural disasters. It's no secret—these events have been here and happening for a few years now.

The scroll text is divided into three unique sections: the face of the future, the face of fear, and finally ends with the face of death. Each face is sequenced with the flash of a colored skull-like mask. I guess it's something best experienced since it's rather hard to explain how he fits all these pieces together. But believe me, he has, and he's done it well.

The demo concludes with a credits/greets screen displayed on top of a neat wavy blue net graphic. Of course everything—the text, the graphics, and the wonderful music—was entirely created by Roy Batty. So, Roy Batty, what are you working on now? Inquiring minds would LOVE to know!

A special thank-you to Phred for supplying me with a de-lynxed version of Tears '97!

Sherry Freedline is a freelance writer and is also the SysOp for the Genie Commodore 64/128 Roundtable. Visit Sherry's homepage on the Internet at http://www.lm.com/~qt, or drop her Email at: sherry@cmdweb.com.

Driven Chart - February '97

1. Eternal/Electron
2. New Millennium/Millenium
3. Etch-A/Style
4. Toasted Brain Cells/Millenium
5. Carnivorous/Carcass
6. Snowflake/Style
7. CAT CE97/FOE
8. Victims/Suraklin
9. Tidal Forces/Omni
10. Treatz/Zone2
11. Inferior/Zone2
12. Drip/DLoC
13. Satan Claws/Carcass
14. 7 Years/FOE
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16. Strive/Zone2
17. First/Omni
18. Wevealed/PSW
19. Sunset Trail/RPG
20. Not Dead/Zone2

1997 NTSC Demo Releases

Spin/PSW
Test Pattern/PSW
Apathy/Suraklin
Tears '97/Roy Batty of Millenium
Texas/The Fatman

Miscellaneous 1997 Releases

Driven #19
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Driven #20

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IN REVIEW

The Compleat Walt
Loadstar

Walt Harned is one of the more prolific general-subject artists on the 64. His work has appeared in countless issues of Loadstar, and this compilation of that work spans three 1581-format disks. The Compleat Walt is a look back at Harned's work over the years, bound together using the familiar Loadstar menu interface.

Each of the dozens of slideshows has at least one accompanying descriptive text, which provides background on what the artist might have been thinking at the time, or what Loadstar was up to when the pictures were first published. Some of the slideshows are actually tutorials, and you can step through 8 different pictures as you read Harned's description of the techniques used to create the final image. One of the tutorials even deals with working from a digitized picture—something quite useful to know about if you're in the market for a Commodore scanner, or perhaps have access to one on another computer and plan to convert the resulting image with something like GoDot (to be released in English very soon, so I hear).

A number of the slideshows also come with whimsical captions and "poetry" attached to them, particularly popular with the animal drawings. Whether this adds atmosphere or gets silly after the second or third repetition is up to you to decide for yourself.

Harned did much of his work in the late 80s, and used standard commercial C64 art tools like Koalapaint and OCP Art Studio. If you're accustomed to the extremely high-res hack display modes popular at European art competitions, you're going to have to look elsewhere.

As is going to happen in any compilation, some shows are hits and others are misses. Some of Harned's more aggressive choices for subject matter don't translate well through his drawing programs and look like dithered messes. On the other hand, some are quite good. His sci-fi subject matter is generally good, and his recreations of famous impressionist works of art is surprisingly successful. Harned even uses the slideshow, complete with music and captioned text to try to tell stories—for example, Peter and the Wolf, as well as the Loadstar-original Dance of the Towers are included for your edification.

All in all, not a bad little collection of artwork. I enjoyed the "operatic" slideshows more than I thought I would, and most of the rest of the work on the three disks is eye-pleasing. It's tough to pass judgement on art, but while Harned does not push the 64's technology to its artistic limit, he does a good drawing and, perhaps more importantly, he's done lots of them.

The Compleat Walt is also available on 1541 format disks.

-J. Compton

SWL (Short Wave Listener)
G & G Electronics

Quick. How do you signal S.O.S in Morse Code? Almost anyone, it seems, can bang out the dits and dahs necessary to send that most basic of Morse Code messages. However, that is about the extent of Morse Code knowledge for many. In this day of high speed modems and fast computer systems (including the Commodore systems), most people regard Morse Code like Latin, a language that no one uses. And, as usual, most people would be wrong. Morse Code is alive and well. Ask any shortwave listener or amateur radio enthusiast (HAM). Morse is used on many low frequency radio bands, and a few allow only Morse transmissions.

So, Morse Code is alive and well, which brings up another problem. Many people don't understand "Morse Code", while others are trying to learn by listening to transmissions. They could hire or otherwise acquire a translator to help them make sense of the dits and dahs, but that's not always useful or practical. What if we could make our Commodore system translate for us?

G and G Electronics produces and distributes just such a device. Called quite simply "SWL" (Short Wave Listener), the system consists of a cartridge that plugs into the C64 expansion port and some cabling. Attach the cable to any Morse Code feed from a shortwave radio or amateur rig, plug in the cartridge, turn on your computer, and Morse Code starts appearing on your monitor or television.

Actually, what you'll initially get on your screen will be gibberish, since decoding Morse Code isn't as easy for a computer to do as a human. Morse Code wasn't really designed for computer reception, for the following reasons:

There is no set "speed" for Morse transmissions. Morse Code is measured in words per minute (WPM) and is commonly sent at anywhere from 5 WPM to 35 WPM or more. There is no special "sync" feature to decipher the transmission speed Morse Code is composed of a single tone broken up into pulses of two durations. A short pulse "dit" and a long one "dah" are repeated in some ordering to create a character. One "dit" length of silence separates the pulses, and a "dah" is defined a being 3 times the length of a "dit". 3 "dit" lengths separate letters, while 7 "dit" lengths separate words. It all sounds easy to implement, but many transmissions don't obey the rules. Why? Morse is commonly sent by humans who don't always follow the rules stated above. A common problem is "bleed", where senders don't leave enough space between dits and dahs. Morse Code has no error correction or parity codes to verify correct reception. Morse can be used to "converse", where multiple senders take turns sending code on a specific frequency. All senders can send at different speeds and use different spacings. All of these problems make good reception more than a simple task. Let's see if the SWL can succeed at overcoming them.

Upon booting the computer, the screen fills with a split screen with some indicators filling the top row. On the left is a tuning indicator. To start decoding Morse Code, type CTRL M. With the cartridge operating and a Morse transmission tuned in, a "dot" will appear and disappear in step with the sound from the radio. If the dot fails to track the sound, a bit of radio tuning is required. At this point, the cartridge start attempts to determine the sending speed by applying the various rules outlined above to the raw input data. It displays results on the screen. Also, the cartridge starts averaging the data collected over

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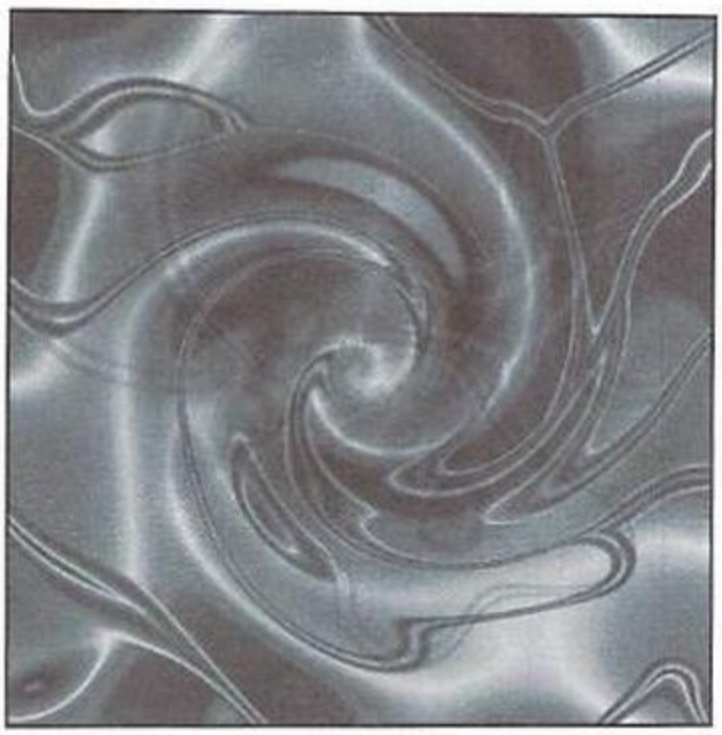
time to compensate for changes in sending characteristics and speed changes.

After a while, the system will start returning something that resembles text. While English is the most common language of Morse Code, it's not mandatory, so all that the system could pick of stuff correctly and you still won't understand it. After playing with the cartridge for a while, I started determining the sending speeds by sound. Since the cartridge takes the most time determining the speed of the transmission, I found that the tuning time could be shortened considerably by telling the system the sending speed. Typing CTRL X <speed> RETURN does the trick. The current speed is shown in the status line on-screen. If the code suffers from "bleed", setting the reception speed a bit higher than the actual speed and locking that speed (CTRL T) will help.

It's hard to explain, but there is a certain thrill that comes when the system starts properly decoding a Morse Code transmission. Although the system requires periodic attention, it can handle changes over time and stay locked onto a transmission pretty well all things considered. In my brief work with it, I copied code sent from Europe, Canada, and a few islands. After a while, I forgot about the mechanics of the system and started simply reading the text like it was a simple terminal conversation between two people.



The cartridge and included software has more to offer the interested listener. SWL offers the ability to decode narrow and wide radio teletype (RTTY) transmissions. RTTY transmissions are sent via mechanical or electronic means, so decoding them is much easier. RTTY can be sent using two methods. We are familiar with ASCII, which can be received at 110 baud and 300 baud by the system. However, many RTTY systems send using BAUDOT, which uses 5 bits to denote a character. Speeds available in BAUDOT include 60, 66, 75, 100, and 132 WPM (For some reason, BAUDOT is specified in WPM). In any case, you can switch to this mode by typing CTRL A for ASCII and CTRL B for BAUDOT. In each mode the CTRL X <speed> RETURN command is used to alter the reception speed. Unlike in Morse Code reception, the system does not "learn" the sending speed in these modes. The SWL RTTY mode can receive either normal or inverted (reversed tones) transmissions.

In RTTY, the tuning dot disappears and a set of bars appear in its place. RTTY uses two tones (much like a 300 bps modem) to transmit information. When tuned to a RTTY transmission, the two bars (one vertical, one horizontal) will form a cross pattern. With the correct speed selected and the cross pattern visible, text will start marching across the screen. In practice, I found tuning RTTY very easy, but finding RTTY transmissions frustrated me. Initially, I simply couldn't find anything on the bands that resembled the classic "warble" of RTTY. Then, as I started finding transmissions that resembled RTTY, I found the SWL unit wouldn't make sense out of them. We later determined that RTTY is only one of many digital transmissions modes. Other modes include AMTOR and PACTOR, which the SWL system doesn't understand.

The built-in SWL software includes such niceties as color configuration, the ability to send results to printer, the option of exiting to BASIC and returning later, and a visible clock. The system also includes a jack for a hand key, so you can practice your code and see how well you are progressing. I found this feature helpful, as I am trying to learn Morse Code. Other features of the system include options to decode commercial RTTY transmissions, which use different tones for transmission. A switch on the back of the cartridge selects which tones you wish to decode. To help receive transmissions under less than ideal conditions, the system includes options to filter Morse Code from RTTY reception and he previously mentioned speed lock mode for Morse reception.

In using the system software, I found a few annoyances that might hinder its use. The software, with its arcane commands set, requires a steep learning curve. There are no menus or command windows to guide the user. Given that the system was developed in the 1980s when such cryptic user interfaces were common, I won't hold that against it. The "NARROW/WIDE" switch on the rear of the unit bothered me, though. Every other option was software configurable, but decoding commercial RTTY requires groping for the cartridge and flipping that switch. Also, the switch appeared to affect Morse reception, so I ended up flipping it back when I selected Morse Code operation. For users who hide their computer under a monitor or have expanded Commodore systems, the constant flipping gets old very quickly. Even more troublesome is the lack of a software indicator for the switch position. I found myself flipping the switch and forgetting about it. When I changed reception modes, I forgot to flip the switch back and then spent a fair amount of time trying to figure out why I couldn't receive any transmissions.

My major complaint concerns the user manual and the many options available in the software that supposedly allows "transmission of stored or typed text. There's an edit window, numerous "memories", and various options to prepare text for transmissions. However, I found only one buried reference in the manual that implied what I finally discerned on my own: the cartridge can't transmit anything. Evidently, the same software is used for two models. The SWL only allows reception. Possibly, there exists a similar unit that allows both reception and transmission. I wish they would have disabled the useless commands and taken them out of the manual. A final nit involves the inability to save transmissions to disk. The manual suggests a product can be purchased to enable this feature, but I find it a glaring omission from the base product.

Complaints aside, I like the product. If you are trying to learn Morse Code, enjoy amateur radio as a hobby, or listen to shortwave transmissions and can't otherwise decode RTTY and Morse Code, the cartridge will be worth the cost of purchase. Never forget what it does, though. In practice, I found the cartridge did a much better job on RTTY than or Morse Code. At first, I blamed the unit, but later determined that it is simply hard to electronically decode Morse Code. Never units might do a better job but are likely less economical. Those who can't handle not being able to decode everything on the air should steer clear of the unit, as it won't handle AMTOR, PACTOR, WEFAX, slow-scan TV, or PACTOR-II modes. Nonetheless, there is plenty of activity in 60 WPM RTTY and Morse Code to keep one busy receiving for months to come.

-Jim Brain

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Carrier Detect

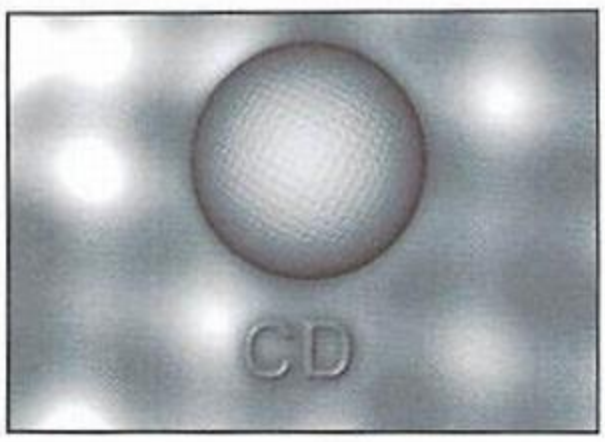
By Gaelyne R. Gasson

GETTING YOUR FILES-AND DECODING THEM TOO!

Have you ever wished you could just "order" a file or program and have it delivered to you through Email? Have visions of commanding an unseen butler to do your bidding for you? Imagine telling this unseen butler, "James, go over to my favorite FTP site and come back with a new game for me." Well, that's not so far fetched because using something called an FTP mail server, you can command it to grab the files you want while you're off having a life. For those who don't have "live" access to the Internet, the ability to get files through Email can be a godsend.

FTP was covered in Issue 16, and we'll be using some of the same terms in our discussion today. Let's start with a brief overview of how it works. FTP means "File Transfer Protocol", it allows you to access FTP sites where files are stored and retrieve them. To get to the file you want, you need to move to the directory that its in, and then issue the command to retrieve it. Usually, files are first transferred to your Internet provider, and then you download the files after finishing the FTP session.

When we use Email to access Internet utilities we need to use something that acts as a "go-between" for us and acts on our commands. This is called a "mail server", and the type of mail server to use depends on the Internet utility we're planning to use. For retrieving files, we use an FTP Mail server and send Email messages to it, with our commands in the body of the message. If we tell the mail server to go to an FTP site and retrieve a file, it does this and sends the file back through Email. Once you get the file, it's in a special format that allows it to be sent as text, usually in either MIME or UUencode format. The file will need to be converted back to binary format before you can make use of it. We'll discuss MIME



and UUencoded files after exploring how to use FTP mail servers.

FTP mail servers are listed in the sidebar. It's generally best to choose one that's closest to you geographically, but there are times when a server that's further away is more accessible or responds faster. A lot of people use these, and they get bogged down in keeping up with the requests (especially after they've been listed in a publication such as this magazine).

You'll also need a list of FTP sites that have Commodore files. Luckily, you can use an FTP mail server to get this list. Once you've got it, you'll know what sites have Commodore files, and the directories that they're kept in. Choose an FTP mail server from the sidebar and address your Email to it. In the body of your message, type:

```
open ftp.jbrain.com
cd /pub/cbm/faq
mode ascii
get cbm-ftp-sites*
quit
```

Let's go over the commands used in the above example one-by-one:

`open ftp.jbrain.com`
The open command tells the mail server what FTP site to go to. In this example, the FTP site is ftp.jbrain.com. If we were using standard FTP, we would have to log in with "anonymous" and type in our Email address; but with an FTP mail server, this is done for us automatically.

`cd /pub/cbm/faq`
The "cd" command that tells the mail server to change directories. In this example the directory it's changing to is /pub/cbm/faq, where files that relate to the comp.sys.cbm newsgroup are held. Some FTP mail servers use the command "chdir" in place of the "cd" command.

`mode ascii`
There are two FTP modes: one is ascii, and the other is binary. By using this command, it tells the server to transfer the file as a text file. If we were getting a program type file, we would specify "binary" here.

`get cbm-ftp-sites*`
This is the command used to get files. The file we're getting is named cbm-ftp-sites, and as it may have additional text after it, such as a date, we've used the asterisk as a wildcard, so any file beginning with cbm-ftp-sites will be sent.

`quit`
This tells the mail server that no more commands will be found within the message. This is particularly useful to avoid error messages that may be received if it tries to process your Email signature or any other text that appears at the end of your Email.

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FTP Mail Commands

The following commands can be used by most FTP mail servers. The list is divided into two halves, the first half relates to commands given BEFORE issuing the command to open an FTP site, and the second half are issued once an FTP site has been opened.

To find the commands allowed by the mail server you've chosen, send it a message with the word "help" in the body of the message. Don't include other commands (except perhaps "quit").

reply-to <email.address>
This is used so the server will send the files retrieved to a different Email address than the one you're sending the Email from. If you use this command, it must be the first one listed in your message.

delete <jobid>
When the mail server has successfully managed to follow your instructions, it sends you an Email letting you know how many requests there are before yours (these are processed in the order they are received) and a unique jobid number. Should you wish to cancel your request, use this command to do so. If you use this command, it should be sent in a message by itself.

open <ftpsite>
This command tells the server to go to a specific FTP site and log in anonymously.

Once you've sent the command to open an FTP site, the following commands can be used. You can send up to 100 instructions to tell the mail server what to do while logged into the site.

cd <pathname>
Change to the directory specified (as shown in the example given above).

ls <pathname> or **dir <pathname>**
These command will send you an Email message listing the files in the directory given in the command. "ls" sends a short list, while "dir" sends a more detailed listing with file sizes and other information. Both commands default to the current directory, so if you use the "ls" or "dir" command without specifying a directory, you will be sent a listing for the one that you are in.

mime
This tells the mail server to sends the message in MIME format. Any text is sent as plain text so you can read it, but non-text files (such as programs or archives) are sent in a coded format referred to as either MIME or "BASE64".

uuencode
This tells the mail server to send you any binary (or non-text) files in UUencoded format. Because FTP mail defaults to using UUencode format, this command is generally not needed.

size <number><k>
Some BBS systems can not process large Email messages, and this command is useful for splitting up such messages into several smaller ones. The 'k' is for kilobytes. Generally, if you use this command, it's probably best to set it for the number of kilobytes your Email provider will allow, or just slightly less. If you don't use this command (it really should only be used if necessary), the mail server doesn't split the resulting Email.

mode binary and **mode ascii**
These change the modes between ASCII and binary mode for retrieving files. If the file is an archive or program file, use "mode binary".

get <filename>
This command retrieves the file you ask for. When you type in the filename, remember that these are case sensitive, so if a file is listed as README.txt, you must type it exactly as it appears (using upper/lower case).

quit
The FTP mail server disregards any text after this command.

FTP Mail Examples

To assist you in getting more familiar with FTP mail commands, here are a couple of simple examples. We'll follow each of the examples with a description of the results they achieve.

FTP Mail Servers

ftpmail@mail.jbrain.com
ftpmail@garbo.uwasa.fi
bitftp@vm.gmd.de (Germany)
ftpmail@inf.tu-dresden.de
ftpmail@ieunet.ie (Ireland)
bitftp@plearn.edu.pl (Poland)
ftpmail@ftp.sunet.se (Sweden)
ftpmail@ftp.luth.se (Sweden)
bitftp@pucc.princeton.edu (USA)
ftpmail@census.gov (USA)
ftp-request@netcom.com
ftpmail@ftpmail.ramona.vix.com
ftpmail@src.doc.ic.ac.uk (UK)
ftpmail@conicit.ve (Venezuela)

Example 1

```
open hal9000.net.au
cd /pub/cbm/info-txt
mime
mode binary
get cbmfido.zip
cd /pub/cbm/unarc_unzip
get nzp17128.sfx
quit
```

Result
Opens the hal9000.net.au FTP site, moves to the /pub/cbm/info-txt directory, changes the method of fetching binary files to MIME, sets the mode to binary and retrieves cbmfido.zip. (This is a weekly updated file with the text from the CBM Fidonet messages in it). The FTP mail server changes to the zip_unzip directory and retrieves nzp17128.sfx. (This archive contains a C128 program that can be used to unzip the cbmfido.zip archive. C64 owners can use the next example to get a C64 program that dissolves PKZip 1.x files.

Example 2

```
open ftp.jbrain.com
cd /pub/cbm/software/archivers/64
mode binary
get pkunzip64.sfx-v1.01
mode ascii
get pkunzip64.sfx-v1.01.readme
quit
```

Result
Opens ftp.jbrain.com site, moves to the /pub/cbm/software/archivers/64 directory, sets the mode to binary and retrieves pkunzip64.sfx-v1.01. It then changes to ascii mode before retrieving pkunzip64.sfx-v1.01.readme and quits.

How long will it be before you receive your files? This depends on several factors including how your Email provider is connected to the Internet. If the system only connects once or twice a day, it could take a day or two for your files to arrive. Another factor is how much use the FTP server is receiving. If it's receiving a lot of activity, it's responses will be slower. However, if the server isn't busy and is functioning well and your Email provider is on-line with the rest of the Internet, you could receive responses back in under an hour. As a general rule of thumb, if you haven't received any messages from the FTP server within 3 days, you should try another server.

Unpacking the Files

Once you've retrieved a binary file, you need a way to decode it so you can use it. How you decode the file depends on what format it arrives in, and whether you're using a BBS, On-line

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Service or UNIX account. If using a BBS or On-line Service for Email, you'll need to download the message with the encoded file and use a Commodore utility to decode it. If you download your Email in QWK mail packets and use QWKRR128 V5.0, you can decode UUencodes and MIME files with the program itself. The only "catch" is that if there is more than one encoded file in a message it only decodes the first file.

If you've told the mail server to split large files, you will need to use a text editor so that the messages are in one file and in the proper order. The Email messages come in numbered, but often they arrive out of sequential order. It's important that you remove any extraneous text between the coded sections so that lines of code line up one after another. If you put the coded sections together in the wrong order the file won't decode properly.

UUencodes

UUencoded files begin with "begin", a number, and the name of the file, such as "begin 644 cooldude.sfx". UUencoded files can be decoded using UUXFER (uuxfer.sfx), ACE (ace16a—ace16e.sfx) or Novaterm 9.6 (commercial). If you're decoding files with uuxfer, you'll need to save it as ASCII.

You can decode the file while on-line if you're using a UNIX system. Save the message as a text file and then decode it by typing: "uudecode <filename>" from the command line. Incidentally, this is the same command to use with ACE to decode uuencodes.

MIME

MIME files have the word "BASE64" within the header text that describes the file, and usually will have a phrase such as "Content-type" in it. You will also see either filename="cooldude.sfx" or name="cooldude.sfx". If you use Pine as your mail program, you can have the file decoded for you by first "viewing" the file (press "v") and then saving it (press "s") when your cursor is over the file name. Newer versions of Elm (another Email program on UNIX systems) will offer to write the file to disk for you. Once the file is decoded, it's in your home directory and you can then download it. You can also use UNIX utilities munpack or metamail to decode the file. The commands are:

```
munpack <filename>   or
metamail <filename>
```

Until now, decoding a MIME file off-line was only possible for registered QWKRR128 users who were game to try the v5 Beta versions. When I told my husband (Rod Gasson, QWKRR128's author) what I was planning to write about for this issue, he offered to create a short BASIC program that lets both C64 and C128 users decode MIME files. Not being one to argue with a good idea, I accepted the offer. For those who aren't into typing in program listings, de-mimer.prg can be found via FTP at hal9000.net.au in the /pub/cbm/utils directory.

To use de-mimer, you must first save the MIME text as ASCII (NOT PETASCII). When you run the program, it prompts for the name of the text file to decode, what drive it's on, and then the destination drive. Rod warns that this program isn't fast, but serves as an example for others who might want to develop a more Whiz-Bang style program to decode MIME files. It'd be great if someone came up with a program that uses a menu and handles both MIME and UUencodes.

Wrap Up

While it's nice to retrieve files through mail, please do so responsibly. Some BBS sysops don't allow you to use this method because it takes up a lot more disk space than what it would if you used FTP directly. If your Sysop doesn't allow you to retrieve files this way, respect his or her policies.

In future issues, we'll be looking into other ways of accessing Internet resources, such as newsgroup articles, gopher menus and World Wide Web sites via Email and on-line utilities. Until next time, may all your connections be line noise free!

Gaelyne Gasson is the author of "The Internet for Commodore C64/128 Users" and can be contacted via Email at gaelyne@cmdweb.com or visit her web site at: http://videocam.net.au/~gaelyne.

√Σ	DEMIMER.BAS
165	10 rem demimer - a c64/128 program to de code mime (base64) files.
205	20 rem program by rod gasson. freeware.
42	30 rem this can be greatly improved. enj oy!
23	40 input "Enter source file to decode";i n$:if in$="" then 40
222	50 input "Enter source drive";d$: dv=va l(d$): if dv<8 or dv>16 then 50
250	60 input "Enter destination drive";d$: d2=val(d$): if d2<8 or d2>16 then 60
128	70 :
28	80 t$="base64":gosub350: bl=li :rem sa ve line number of base64 text
59	90 t$="name=" :gosub350:n$=mid$(a$,l+5): rem filename for output.
158	100 :
255	110 open 8,dv,8,in$:li=0
67	120 get#8,x$:if x$<>chr$(13) then 120 : rem skip lines to base64 line
44	130 li=li+1 : if li<>bl then 120
167	140 get#8,a$: if a$=chr$(10) then 140 :rem then read data
203	150 if a$<>chr$(13) then 140 :rem until two consequtive
206	160 get#8,a$: if a$=chr$(10) then 160 :rem carriage returns are found
62	170 if a$<>chr$(13) then 140 :rem ignore linefeeds
146	180 print:print:print "Decoding file ('n $")" :print:print
248	190 :
113	200 open15,d2,15:open 9,d2,9,(n$+",p,w")
166	205 get#15,e:if e then print "write file error" :close8:close9:close15 :end
34	210 for i=1 to 4
25	220 get#8,a$(i): if at then a$(i)=chr$(0)
76	230 if a$(i)=chr$(10) or a$(i)=chr$(13) then 220

√Σ	DEMIMER.BAS *(cont.)*
107	240 if asc(a$(i))<43 or asc(a$(i))>122 then close 8: close9: close15:end
77	250 if asc(a$(i))=43 then a(i)=62 :goto 320
63	260 if asc(as(i))=47 then a(i)=63 :goto 320
19	270 if asc(a$(i))=61 then a(i)=64 :goto 320
214	280 if asc(as(i))<47 then a$(i)=chr$(0) :goto 240
58	290 if asc(a$(i))<62 then a(i)=asc(a$(i))+4 :goto320
1	300 if asc(a$(i))<97 then a(i)=asc(a$(i))-65 :goto320
55	310 a(i)=asc(as(i))-71
157	320 br=br+1:print"{CRSR UP}Bytes read";b r;"{2 SPACES}Bytes written"bw: next
14	330 a1=a(1)*4+(a(2)and48)/16:a2=(a(2)and 15)*16+(a(3)and60)/4
216	335 a3=(a(3)and3)*64+a(4):print#9,chr$(a 1)+chr$(a2)+chr$(a3); :bw=bw+3: goto210
143	340 :
103	350 open15,dv,15: open 8,dv,8,in$
100	355 get#15,e: if e then print "read file error":close8:close15:end
149	360 li=0 : print"checking for :";t$
31	370 a$="" :f=0 :
214	380 get#8,x$: n=n+1:if x$= chr$(13) then li=li+1 :goto 420
24	390 if x$=chr$(34) then 380
251	400 if asc(x$)>96 and asc(x$)<123 then x $=chr$(asc(x$)-32)
35	410 a$=a$+x$: if n=0 then 380
107	420 fori=1tolen(a$):if mid$(as,i,len(t$))=t$ then f=1:i=i-1: n=1 :i=len(as)
55	430 next:if s=0 then 370
194	440 close8: close15: if f=0 then print " Not a recognised MIME file" :end
82	450 return

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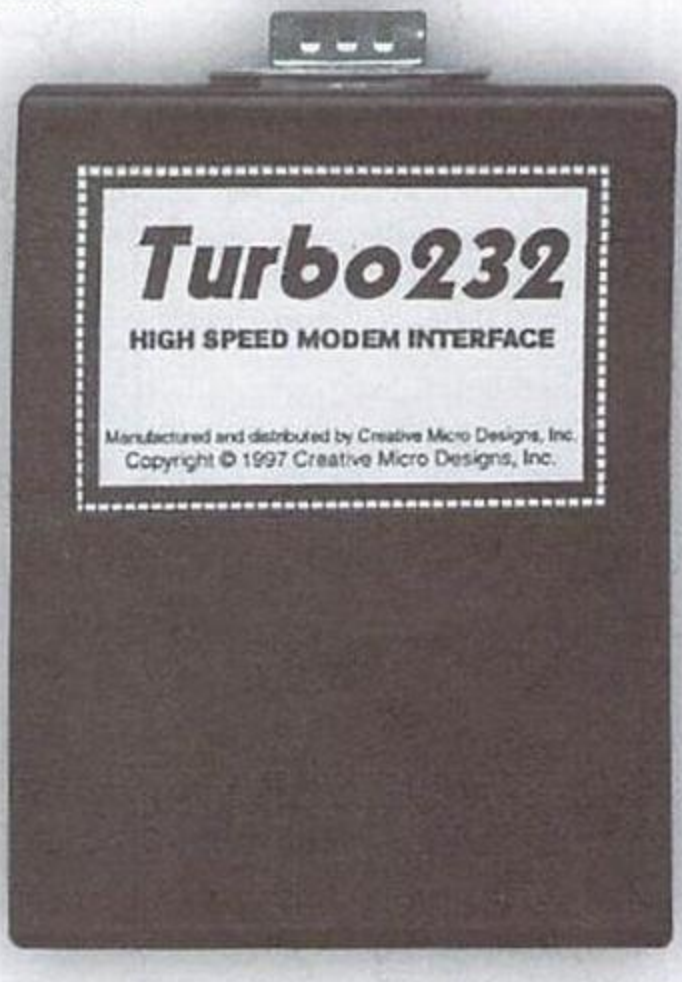
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GEO PROGRAMMIST

DEALING WITH GEOPAINT FILES

By Maurice Randall

There are two graphics formats that have become standard within GEOS. The most common is the Photo Scrap and the other is a geoPaint file. GEOS was designed with the idea of being able to freely exchange Photo Scraps between applications. The disk drive is used as the temporary storage as one application is exited and another is opened. The application that is used most commonly for creating Photo Scraps is geoPaint. A user can draw an image using geoPaint and then cut or copy the image to a Photo Scrap file and then exit out and load up geoWrite, where the image can be loaded back into a geoWrite document.

A programmer wishing to work with Photo Scraps has some of the work already handled since the GEOS operating system has routines built in for displaying a Photo Scrap to the screen once it is loaded somewhere within the memory of the computer. Occasionally, a programmer might have an idea for a new application that will need to manipulate a geoPaint file in one way or another. There are no built-in routines for this job. You, the programmer must create them and include them into your own application. Perhaps you would like to create a geoPaint viewer or also an application that can convert a geoPaint file into another image format. Or maybe you need to go the other way and convert another format into a geoPaint file. Being able to edit an existing geoPaint file is another idea.

The Data File Layout

But first we need to understand how geoPaint files are laid out. Once understood, they are really quite simple to deal with. The reason being is that a geoPaint file is specifically geared for the 64's 40 column screen memory layout. Our 40 column screen is manipulated within memory in chunks of 8 bytes at a time. These 8 bytes are stacked on top of each other so that we have an area that is 8 pixels high by 8 pixels wide. This 8 by 8 area is commonly known as a card. Within this card, each of the 64 pixels may be either on or off, or otherwise considered to be a foreground pixel or a background pixel. If the bit is on, it is a foreground pixel. Within GEOS, we can have two different colors within each of these 8 by 8 card areas. One color is for the foreground bits and the other for the background bits.

Across the width of the 40 column screen, we have exactly 40 of these card areas. The width of a geoPaint image corresponds to the width of a printed sheet of paper that runs through your printer. The printable area of that paper is 8 inches wide. Since a geoPaint image has a resolution of 80 dots per inch horizontally, there will end up being 640 dots across the width of the page in this 8 inch area. Across the width of the 40 column screen, there are 320 dots, or pixels, which means that a geoPaint image is exactly twice the width of the screen.

Let's look at the rest of the geoPaint image. All geoPaint images are exactly the same height, 10 inches. This is true even if the user only drew something in the upper portion of the image. Even though the lower part of the image appears blank, the file is still 10 inches high. I'll explain further in a minute.

The resolution of a geoPaint file in the vertical direction is 72 dots per inch. Since we have 10 inches in height, that means that we have 720 dots vertically. So, how many rows of cards does that equal? Easy. 720 divided by 8 gives us 90 rows of cards. Remember I said that a geoPaint file is laid out just like the screen, only it is larger in width and height. So, how are these rows of cards stored in the file? Let's find out.

If you remember our discussion of VLIR files a number of issues ago, you know that a file can be stored on disk in separate records within the file. GeoPaint uses the VLIR format and will store its data within the first 45 records of each file. This would be records 0 through 44. Any data stored within any other record is ignored by geoPaint. Within each of these records, there is exactly two card rows of data stored. In addition, the color data for each of these two rows is also stored within the same record. However, you can't just read the data in directly because it is in a compressed format. Compression is used for obvious reasons. GEOS started out with just 1541 drives and storage space was limited. Also, with less data to load or save, disk operations are much faster. The time spent compressing or uncompressing data within memory is more than made up by the time saved in loading from or saving to disk.

Once the data from one record is uncompressed, a total of 1448 bytes are generated. Here is how it appears:

640 bytes (80 cards) of data for the first card row.
640 bytes (80 cards) of data for the second card row.
8 bytes of unused data.
80 bytes of color data for the first card row.
80 bytes of color data for the second card row.

Each byte of color data holds the foreground color in the upper nybble and the background color in the lower nybble of the byte.

When geoPaint creates a file, it always takes exactly 1448 bytes of data and then stores it into the record it belongs in depending on which part of the page that data came from. If geoPaint is loading in data, it will read a record in and uncompress the data. With two complete card rows of data in memory, it can display any portion of the data to the screen depending on where the user has scrolled the viewing window. Once those two card rows are displayed, geoPaint will read in two more card rows and so on until it has filled up the viewing window.

Understanding these simple concepts will help you to create your own utilities and applications for handling geoPaint files. But we also need to learn how to compress and uncompress the data just like geoPaint would want it. The compression method that geoPaint uses is highly geared to the display method. Since data is displayed in card format, it is possible for us to have repeating patterns of 8 bytes at a time. This is especially true when the user is painting areas with the available patterns supplied by GEOS and geoPaint.

Let's take a brief look at the compression method. Remember, a geoPaint file consists of 45 records. Each record holds two card rows (16 raster lines) of image data. Within each record, the data is compressed. The compressed data is broken down into chunks. Each one of these chunks begins with a

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command byte which will tell us how that chunk is to be interpreted. There are 3 types of chunks, one type can contain a byte that can be repeated up to 127 times, another can contain a repeating pattern of 8 bytes, and the 3rd type can contain a series of unique bytes that does not form any kind of pattern. Bits 6 and 7 of the command byte is used to identify the type of chunk.

If bit 7 is set, the command byte is 129 or higher and this indicates a repeating byte type.

If bit 7 is clear and bit 6 is set, the command byte is 65-127 and this indicates a repeating 8 byte pattern type.

If both bits 6 and 7 are clear, the command byte is 1-63 and this indicates a unique series of bytes with no apparent pattern.

In the repeating byte type, we take the value stored in bits 0-6 of the command byte. This value can be between 1 and 127. If it is 0, then the command byte is invalid and is actually an error in the geoPaint data. Therefore, a command byte will never equal 128. Once we arrive at a value from the command byte, we look at the next byte following it. This byte will be repeated anywhere from 1 to 127 times, depending on the value in the command byte.

In the repeating 8 byte type, we take the value stored in bits 0-5 of the command byte. Again, if it is 0, then we have an error. But otherwise it will be between 1 and 63. Then we look at the next group of 8 bytes. This group of 8 bytes forms a pattern that is to be repeated anywhere from 1 to 63 times, depending on the value of the command byte.

Finally, in the unique byte type, we also take the value stored in bits 0-5 of the command byte. If it is 0, we know we have an error. Otherwise, it will be between 1 and 63. This means that we take that number of bytes that follow the command byte and use them just as they are. They are not compressed at all.

Working With The Data

Now let's get to work on reading and writing a geoPaint file. Since we will be working with one record (2 card rows) at a time, we need a buffer to hold 1448 bytes of uncompressed data. We can use the same buffer while reading and writing. When we write to a geoPaint file, we will also need a buffer for building the compressed data prior to writing it out to the record, but while reading from a geoPaint file, we can let GEOS buffer the incoming data for us. We can use the routine ReadByte to read in one byte at a time as needed. Of course, as a programmer, feel free to alter this method to suit your own tastes. You might want to read the whole record into memory and then uncompress the data either to the 1448 byte buffer or directly to the screen or whatever other purpose you have in mind. The method shown here is just one of many ways to accomplish this task.

Reading a GeoPaint File

In the source code provided here, we will take a geoPaint file and load up a table that will contain track and sector pointers to the starting sector of each of the 45 records. The code itself reads one record at a time and uncompresses the data into the 1448 byte buffer. We merely tell the code which record to read and the rest is handled. You might notice that the code that actually reads in the data and uncompresses it will stop if a disk error occurs, but an error at this point can actually be ignored by the calling routine. Doing so would allow the geoPaint file to still be read as much as possible. Disk errors are not as important when reading a file as they are when writing a file. This might be a good idea for a new application, one that could read in a corrupted geoPaint file and recompress each record and rewrite the data to a new file. GeoPaint doesn't particularly like corrupted files.

```
;this is a simple example of how to read in a geoPaint file.
;This code assumes that a buffer already contains the name
;of the desired file. A dialogue box could be used to prompt
;the user for this filename.

ReadPaint:
   LoadW   r6,#nameBuffer      ;point to the filename.
   jsr     GetIndex            ;set pointers to the records.
   txa
   bne     90$                 ;branch if error or not geoPaint.
   ldx     #0
   stx     curCardPair         ;point to the first record.
20$
;. . .
;at this point, it would be a good idea to clear the
;1448 byte buffer except for the color data portion
;which should be filled with the default
;dark gray over light gray colors.
;This is done in case of an empty or corrupted record.
;. . .
   LoadW   r2,#cardBuffer      ;set pointer to 1448 byte buffer.
   jsr     LdBuf               ;uncompress a record and fill
                               ;the buffer with two card rows

;. . .
;at this point, we can do whatever our application is
;going to do with these two card rows of data.
;The variable dataLoaded can be checked to see if any
;data was actually loaded or if the record was empty.
;. . .
   inc     curCardPair         ;point to the next record.
   ldx     curCardPair
   cpx     #45                 ;have we read the last record?
   bcc     20$                 ;branch if not.
   rts

nameBuffer:
   .block  17                  ;buffer for a filename.
curCardPair:
   .block  1                   ;pointer to current record.

cardBuffer:
line1Buffer:
   .block  640                 ;data for the first card row of the
                               ;record.
line2Buffer:
   .block  640                 ;data for the second card row of
                               ;the record.
extraBytes:
   .block  8                   ;these are not used.
line1Color:
   .block  80                  ;color data for the first card
                               ;row.
line2Color:
   .block  80                  ;color data for the second card
                               ;row.
```


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```
junkBuffer:
  .block  8                ;a safety measure in case of a
                           ;slight buffer overflow while
                           ;reading data. This prevents
                           ;trashing the following code.

;call this routine with r6 pointing to a buffer holding
;the filename of a geoPaint file.
;Any non-zero value in x upon exit indicates either an error
;or the file is not a geoPaint.
;This will also load track and sector pointers to the
;records in two buffers at trackIndex and sectorIndex.
;This frees up fileHeader for other uses while you are
;working with the geoPaint image.

GetIndex:
  jsr     FindFile
  txa
  bne     90$              ;branch if not.
  LoadW   r9,#dirEntryBuf
  jsr     GetFHdrInfo      ;get some stuff on this file.
  txa
  bne     90$              ;branch if any problems.
  jsr     CmpIfPaint       ;is this file a geoPaint file?
  bne     90$              ;branch if not.
  MoveW   dirEntryBuf+1,r1
  LoadW   r4,#fileHeader
  jsr     GetBlock         ;load the VLIR index block.
  txa
  bne     90$              ;branch if any error.
  ldx     #0
  ldy     #0
20$
  lda     fileHeader+2,x
  sta     trackIndex,y     ;create a table of 45 track
  lda     fileHeader+3,x
  sta     sectorIndex,y    ;and sector pointers.
  inx
  inx
  iny
  cpy     #45
  bne     20$
  ldx     #0               ;indicate no errors.
90$
  rts

;load the header block for the desired file into
;fileHeader and then use this routine to verify
;that the file is a geoPaint data file.
;Equals flag or the x register may be checked
;upon exit. x=0 if geoPaint.

CmpIfPaint:
  LoadW   r0,#gpName       ;point to permanent name.
  LoadW   r1,#(fileHeader+77)
  ldx     #r0
  ldy     #r1
  lda     #11              ;only check 11 characters.
  jsr     CmpFString       ;are the two names the same?
  bne     90$              ;branch if not.
  ldx     #0               ;set the equals flag.
  rts
90$
  ldx     #128             ;clear the equals flag.
  Rts                      ;(not a geoPaint file)

gpName:
  .byte   "Paint Image",0  ;permanent name from
                           ;any geoPaint data file.

cmdByte:
  .block  1
dataLoaded:
  .block  1
bufLength:
  .block  2
trackIndex:
  .block  45
sectorIndex:
  .block  45

;Before calling this routine, point r2 to a 1448 byte buffer.
;This will load the buffer with the data from the geoPaint record
;that x points at. Therefore x should have a value between 0 and 44
;upon entry. If any data was loaded, then dataLoaded will have
;bit 7 set, otherwise cleared.
;The calling routine might want to clear the buffer prior
;to calling this routine to erase any data from the previously
;loaded record.
;Destroys r1 - r5.
;Assume no errors, value of x is not valid upon exit.

LdBuf:
  LoadB   dataLoaded,#0
  clc
  lda     r2L
  adc     #(1448
  sta     bufLength+0      ;set a pointer to the
  lda     r2H
  adc     #)1448
  sta     bufLength+1      ;end of the buffer.
  lda     trackIndex,x     ;is this an empty record?
  beq     15$              ;branch if so and do nothing.
  sta     r1L              ;set r1,r4,r5 for ReadByte.
  lda     sectorIndex,x
  sta     r1H
  LoadW   r4,#diskBlkBuf
  LoadB   r5H,#0
  sta     r5L
10$
  jsr     ReadByte         ;fetch a command byte.
  cpx     #0               ;any disk error?
  bne     15$              ;branch if so.
  cmp     #0               ;end of data?
  bne     20$              ;branch if not.
```


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```
15$
  rts
20$
  sta     cmdByte           ;save for other routines.
  LoadB   dataLoaded,#128   ;we have data.
  lda     cmdByte
  cmp     #$80              ;is this a $80?
  beq     15$               ;branch if so. (invalid)
  bcc     40$               ;branch if less than $80.
  jsr     RepeatByte
  beq     10$               ;branch if more data.
  rts
40$
  cmp     #$40              ;is this a $40?
  beq     15$               ;branch if so. (invalid)
  bcc     50$               ;branch if less than $40.
  jsr     Repeat8Bytes
  beq     10$               ;branch if more data.
  rts
50$
  jsr     DoUniqBytes
  beq     10$               ;branch if more data.
  rts

;this is called by LdBuf.
DoUniqBytes:
10$
  jsr     ReadByte          ;get the next byte.
  cpx     #0                ;any disk error?
  bne     90$               ;branch if so.
  ldy     #0                ;store this byte to the buffer.
  sta     (r2),y
  inc     r2L               ;increment the buffer pointer.
  bne     60$
  inc     r2H
60$
  CmpW    r2,bufLength      ;have we filled the buffer?
                            ;(don't assume the record is
                            ;not corrupted).
  bcs     90$               ;branch if so.
  dec     cmdByte           ;have we read the correct number
                            ;of unique bytes?
  bne     10$               ;branch if not.
  ldx     #0                ;no errors.
  rts
90$
  ldx     #128              ;some sort of error occured.
  rts

;this is called by LdBuf.
RepeatByte:
  and     #%01111111        ;get value of bits 0-6
  sta     cmdByte           ;and store it.
  jsr     ReadByte          ;get the byte to repeat
  sta     uniqByte          ;and save it.
  cpx     #0                ;any disk error?
  bne     90$               ;branch if so.
  ldy     #0
10$
  lda     uniqByte
  sta     (r2),y            ;put the byte into buffer.
  inc     r2L
  bne     60$
  inc     r2H               ;increment buffer pointer.
60$
  CmpW    r2,bufLength      ;don't overflow the buffer.
  bcs     90$               ;branch if end of buffer.
  dec     cmdByte           ;did we repeat enough times?
  bne     10$               ;branch if not yet.
  ldx     #0                ;indicate no errors.
  rts
90$
  ldx     #128              ;we had an error.
  rts

uniqByte:
  .block  1

;this is called by LdBuf.
;Destroys r3.
Repeat8Bytes:
  and     #%00111111        ;get value from bits 0-5
  sta     cmdByte           ;and store it.
  LoadB   repeatCount,#8
  MoveW   r2,r3             ;r3 will point to the 8
                            ;bytes that are read in.
10$
  jsr     ReadByte          ;get one of the 8 bytes.
  cpx     #0                ;check for an error.
  bne     90$               ;branch if error.
  ldy     #0
  sta     (r2),y            ;store the byte.
  inc     r2L
  bne     15$
  inc     r2H               ;increment the buffer pointer.
15$
  dec     repeatCount       ;did we read 8 bytes yet?
  bne     10$               ;branch if not.
  beq     25$
20$
  AddVW   #8,r2             ;point 8 bytes further.
25$
  CmpW    r2,bufLength      ;watch for an overflow.
  bcs     90$               ;branch if so.
  dec     cmdByte           ;have we repeated the desired
                            ;number of times yet?
  beq     80$               ;branch if so.
  ldy     #0
30$
  lda     (r3),y            ;repeat these 8 bytes.
  sta     (r2),y
  iny
  cpy     #8                ;did we do 8 bytes yet?
  bne     30$               ;branch if not.
  beq     20$               ;branch if so.
80$
```


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```
  ldx   #0              ;indicate no error.
  rts
90$
  ldx   #128            ;an error occured.
  rts

repeatCount:
  .block  1
```

As you can see, reading in a geoPaint data file is not too difficult. The file itself is nicely organized in 45 records and we simply deal with it one record at a time. Once a record is in memory and uncompressed into our 1448 byte buffer, we can work with the entire buffer or any portion of it. Just remember how it is organized, in card format. If your application has enough room in memory to work with, you could have more than one buffer for reading in records.

Compressing GeoPaint Data

Writing to a geoPaint file as compared to reading a file is a bit trickier. We still deal with one record at a time, but the tough part is that our code must look at the data in the 1448 byte buffer and compress it. The code must try to detect 8-byte patterns or repeating bytes. If it doesn't find either of these, then it must test for unique bytes until an 8-byte pattern or repeating byte occurs.

We must also think about the code that is generated with each type here. The 8-byte pattern type can take 16 or more bytes of data and will generate 9 bytes of compressed code. The repeating byte type can take up to 127 bytes of data and will generate 2 bytes of code. The unique byte type will take up to 63 bytes of data and will generate that number of bytes plus 1 byte for the command byte. It is best if we can find patterns since the unique byte type of code can actually make our file a little bit larger.

Also, when we are analyzing the data, if we find two identical bytes but not a third one, we won't consider these two bytes as repeating since they will still generate 2 bytes of code. If we find 3 or more identical bytes, then we will compress these as being repeating bytes of data.

The code supplied here does not actually write the data to a disk file. The example here will take the 1448 byte buffer and copy it to another buffer in a geoPaint compressed format. Remember, the entire buffer is compressed as a whole. Once you have compressed the data, you can then create your own routines for writing it to a geoPaint file. The easiest method is to use the VLIR routines that are built into GEOS. This way, the sectors are properly allocate as the data is written. If you use PutBlock, then you will have to allocate the sectors prior to writing to them. You will also have to build a list of available sectors. It's not that tough to do, but GEOS has made it easier with the VLIR routines such as WriteRecord.

Let's look at the code now. This assumes that the 1448 byte buffer is already filled with data. Upon exit, the buffer at compactBuffer will contain the compressed data which will be ready for writing to a geoPaint record.

```
;The code for calling the compression routines is simple.
;To begin with, cardBuffer holds the bitmap data in geoPaint
;card format. Upon exit, compactBuffer will hold the same data
;in compressed form and r0 will point one byte past the end
;of the compressed data.

CompData:
  LoadW   r0,#compactBuffer
  LoadW   r1,#cardBuffer
  jmp     PaintCompact

;this is the buffer that will hold the compressed data. It must be
;large enough in case there are no patterns of bytes or repeating
;bytes.
compactBuffer:
  .block  1448+23

;here are some constants that will be used for various threshhold
;settings.
MAX_REPEAT =127
MAX_UNIQUE =63
MAX_MATCHING =63
MATCH_THRESH =2
UNIQ_THRESH =3

;set r0 to point to the destination buffer in which to store
;the compacted bitmap data. r1 must point to the data that is
;to be compacted.
;r0 will return pointing to the byte following the last byte in
;compacted data.

PaintCompact:
  LoadW   r2,#1448          ;number of bytes left to compress.
10$
  jsr     CountRepeat       ;check how many repeating bytes.
  cmp     #UNIQ_THRESH      ;is there less than 3?
  bcc     20$               ;branch if so.
  jsr     PutRepeat         ;compress these bytes.
  bra     80$
20$
  jsr     CountMatchingCards;look for 8-byte matches.
  cpx     #MATCH_THRESH     ;is there at least 2 matches?
  bcc     50$               ;branch if not.
  jsr     PutCards          ;compress this data.
  bra     85$
50$
  jsr     DoUnique          ;count unique bytes.
80$
  clc
  lda     r5L               ;number of bytes compressed.
  adc     r1L
  sta     r1L               ;adjust buffer pointer.
  lda     r1H
  adc     #0
  sta     r1H
  sec
  lda     r2L
  sbc     r5L
  sta     r2L               ;adjust bytes remaining.
  lda     r2H
  sbc     #0
  sta     r2H
85$
```


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```
  lda     r2L
  ora     r2H             ;any bytes left?
  bne     10$             ;branch if so.
  ldy     #0
  tya
  sta     (r0),y          ;end data with a 0.
  inc     r0L             ;point one byte past data.
  bne     88$
  inc     r0H
88$
  rts

;this will look at the next byte in the buffer and
;count how many bytes it finds following it that
;are the same
CountRepeat:
  ldy     #0
  lda     (r1),y          ;get the first byte to check
  sta     r6L             ;and save it.
10$
  lda     r2H             ;are there a bunch of bytes left?
  bne     20$             ;branch if so.
  cpy     r2L             ;are we at the end of the buffer?
  beq     90$             ;branch if so.
20$
  cpy     #MAX_REPEAT     ;have we found 127 matches?
  beq     90$             ;branch if so.
  lda     (r1),y          ;get the next byte from buffer.
                          ;(first time through, we're checking
                          ;the same byte)
  cmp     r6L             ;does this one also match?
  bne     90$             ;branch if not.
  iny                     ;point to next byte and also
                          ;the counter for number of matches.
  bne     10$             ;branch always.
90$
  tya                     ;accumulator holds number of matches.
  rts

PutRepeat:
  sta     r5L             ;number of bytes to compress.
  ldy     #0
  ora     #%10000000      ;create the command byte.
  sta     (r0),y          ;and store it.
  lda     (r1),y          ;get byte that is repeated.
  iny
  sta     (r0),y          ;and store it.
  AddVW   #2,r0           ;adjust destination pointer.
  rts

;this is the most involved routine as in order to
;determine unique bytes, it must also check for
;repeating patterns and stop when it finds one.
DoUnique:
  PushW   r1              ;save source pointer.
```


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```
  LoadB   r5L,#0
10$
  inc     r5L
  ldx     r5L             ;increment unique counter.
  lda     r2H             ;a bunch of data left?
  bne     20$             ;branch if so.
  cpx     r2L             ;at end of data?
  beq     90$             ;branch if so.
20$
  cpx     #MAX_UNIQUE ;maximum unique bytes found?
  beq     90$             ;branch if so.
  inc     r1L             ;increment source pointer.
  bne     30$
  inc     r1H
30$
  jsr     CountRepeat     ;see if any repeating bytes now.
  cmp     #UNIQ_THRESH    ;less than 3 repeating bytes?
  bcc     40$             ;branch if so.
  bcs     90$             ;branch if 3 or more.
40$
  jsr     CountMatchingCards;see if any repeating cards.
  cpx     #MATCH_THRESH   ;is there at least 2 matching cards?
  bcc     10$             ;branch if not.
90$
  PopW    r1
  lda     r5L             ;get number of unique bytes found.
  ldy     #0
  sta     (r0),y          ;and store it as a command byte.
95$
  lda     (r1),y          ;copy the unique bytes to destination.
  iny
  sta     (r0),y
  cpy     r5L             ;all bytes copied?
  bne     95$             ;branch if not.
  inc     r5L
  clc
  lda     r5L             ;adjust the destination pointer.
  adc     r0L
  sta     r0L
  lda     r0H
  adc     #0
  sta     r0H
  dec     r5L
  rts

CountMatchingCards:
  ldx     #0              ;init the counter.
  lda     r2H             ;a bunch of data left?
  bne     5$              ;branch if so.
  lda     r2L             ;is there at least
  cmp     #MATCH_THRESH*8 ;16 bytes left?
  bcs     5$              ;branch if so.
  rts
5$
  clc
  lda     r1L
  adc     #8
  sta     r7L
  lda     r1H
  adc     #0
  sta     r7H             ;r7 points 8 bytes past current r1
                          ;pointer.
  LoadW   r8,#8           ;r8 will hold the total number of bytes
                          ;in this segment.
  inx                     ;always at least 1 8-byte group.
10$
  ldy     #7
20$
  lda     (r7),y          ;check a byte from this 8-byte block.
  cmp     (r1),y          ;does it match?
  bne     95$             ;branch if not.
  dey                     ;have we checked 8 bytes?
  bpl     20$             ;branch until so.
  AddVW   #8,r8           ;increment byte count.
  AddVW   #8,r7           ;increment pointer for checking.
  inx                     ;increment matching card counter.
  CmpW    r8,r2           ;any bytes left?
  bcs     90$             ;branch if not.
  cpx     #MAX_MATCHING   ;maximum number of matching cards?
  bne     10$             ;branch if not.
  rts                     ;x = number of matching cards.
90$
  SubVW   #8,r8           ;readjust things.
  SubVW   #8,r7
  dex
95$
  rts

PutCards:
  ldy     #0
  txa                     ;number of cards in acc.
  ora     #%01000000      ;create the command byte.
  sta     (r0),y          ;and store it.
10$
  lda     (r1),y          ;store the next 8 bytes
  iny
  sta     (r0),y          ;to the destination buffer.
  cpy     #8              ;have we done 8 yet?
  bne     10$             ;branch if not.
  AddVW   #9,r0           ;adjust the destination pointer.
  MoveW   r7,r1           ;adjust the source pointer.
  sec
  lda     r2L             ;adjust bytes remaining count.
  sbc     r8L
  sta     r2L
  lda     r2H
  sbc     r8H
  sta     r2H
  rts
```

This should give you enough information to get started in working with geoPaint files. Now start thinking about a useful utility or application that can work with geoPaint files. Start programming.

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816 BEAT

SUPERCPU INTERRUPTS

By Mark Fellows

Handling interrupts on the SuperCPU is a unique challenge. Both the 65C816 and SuperCPU have a number of new registers and modes which must be considered when writing interrupt service routines. The aim of this article is to provide programmers with a solid foundation upon which to build their own SuperCPU-aware interrupt routines that take full advantage of the enhanced instruction set and extended addressing of the 65C816.

New 65C816 Interrupts

The 65C816 includes two new interrupts that may not be familiar to the C64/128 programmer: ABORT and COP.

ABORT is a hardware interrupt invoked by a negative pulse (or level) on the ABORTB pin of the 65C816. ABORT will inhibit modification of any internal register during the current instruction, and upon completion of the instruction, will initiate an interrupt sequence. The location of the aborted opcode is stored as the return address in stack memory. Besides RESET, ABORT has the highest interrupt priority. ABORT is not currently implemented in the SuperCPU, and is reserved for future use.

COP is a software interrupt initiated by executing the 65C816 COP instruction (opcode $02). The byte following the COP opcode is called the COP signature. COP signatures $00-$3F may be user defined. Signatures $40-$7F are reserved by the SuperCPU operating system, and signatures $80-$FF are reserved for use on future WDC microprocessors. A COP interrupt handler can examine the stack to find the location of the COP signature, and then examine the signature in order to determine the appropriate course of action.

Except for having a different vector location, COP works exactly like BRK—the other 65C816 software interrupt. Upon return from a COP or BRK interrupt the 65C816 resumes execution at a point two bytes ahead of the COP or BRK opcode (the processor does not execute the signature byte). Therefore, a BRK interrupt handler can also find and examine the signature byte in order to determine what action should be taken. All BRK signatures ($00-$FF) may be user defined.

Emulation Mode vs. Native Mode

There are important differences in the way that the 65C816 handles interrupts in the Emulation and Native modes. The programmer must be aware of these factors when designing new, larger programs for the SuperCPU which are located in banks above 00.

In emulation mode, the PBR (Program Bank Register) is automatically cleared to 00 whenever an interrupt occurs. The previous contents of the PBR is not saved on the stack. If an emulation mode program is running in a bank other than 00 when an interrupt occurs, the RTI instruction at the end of the interrupt service routine will not restore the PBR to its former value. Because of this, it is impractical to implement interrupt routines in emulation mode programs that are located in banks other than 00.

Fortunately, the 65C816 Native Mode does not have this shortcoming. When an interrupt occurs in Native Mode, the PBR is automatically saved on the stack. When an RTI is executed in Native Mode, the 65C816 automatically pulls the PBR off the stack so that execution of the interrupted routine will resume in the correct bank.

The Decimal Flag

On 6502/6510/8500/8502 processors, the Decimal (D) flag in the processor status register (Bit 3) is unknown after reset and remains unchanged after an interrupt occurs. On the 65C816, however, the D flag is cleared whenever a reset or interrupt occurs. In practice, this difference causes few problems with existing software written for the Commodore processors. There are two reasons: 1) On all processors, the former value of the status register (including the D flag) is restored upon execution of an RTI instruction and, 2) Commodore programs that use decimal mode usually include interrupt handlers that begin by clearing the decimal flag with the CLD instruction.

Interrupt Sequence

The 65C816 responds to an interrupt by initiating a sequence of machine cycles that first save the program counter and status register on the stack. Next, the address stored at the corresponding interrupt vector is moved into the program counter and the processor begins execution of the interrupt routine at that address. In the case of hardware interrupts (IRQ, NMI, ABORT, RESET), the 65C816 will wait until the currently executing instruction is completed before beginning the interrupt response sequence. An IRQ will not invoke the interrupt sequence if the interrupt disable flag has been set via the SEI instruction. All other interrupts (BRK, COP, NMI, ABORT, RESET) are non-maskable and will initiate a response regardless of the interrupt disable flag.

65C816 Interrupt Sequence (IRQ, NMI, ABORT, RESET)

Cycle	Operation
1	(internal operation)
2	(internal operation)
(3)	Push Program Bank Register (Native Mode only)
4	Push Program Counter (High Byte)*
5	Push Program Counter (Low Byte)*
6	Push Processor Status Register
7	Fetch Interrupt Vector Address (Low Byte)
8	Fetch Interrupt Vector Address (High Byte)
1	Fetch first opcode of Interrupt Routine

* Address of next instruction to be executed upon RTI

65C816 Interrupt Sequence (BRK, COP)

Cycle	Operation
1	Fetch BRK or COP opcode
2	Read BRK/COP Signature
(3)	Push Program Bank Register (Native Mode only)
4	Push Program Counter (High Byte)*
5	Push Program Counter (Low Byte)*
6	Push Processor Status Register
7	Fetch Interrupt Vector Address (Low Byte)
8	Fetch Interrupt Vector Address (High Byte)
1	Fetch first opcode of Interrupt Routine

* Address of BRK/COP Signature + 1

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Vector Locations

The 6510/8500/8502 processors in the C64/128 have three interrupt vector locations: NMI at $FFFA,B; RESET at $FFFC,D; and the shared IRQ/BRK vector at $FFFE,F. In Emulation mode, the 65C816 uses these same locations, as well as the new ABORT vector at $FFF8,9 and the COP vector at $FFF4,5. Vector location $FFF6,7 is reserved for future use.

When the 65C816 is in Native mode, a new set of vector locations is employed. At first glance, the new vectors may seem to add unnecessary complexity, but in practice prove to be quite helpful because special interrupt handlers are needed in the Native mode to save and restore the various 65C816 registers and register states. The Native mode also provides the programmer with the luxury of a separate BRK vector location. This is both a convenience and a necessity because the BRK flag (Bit 4) in the processor status register becomes the Index Register Select bit in Native mode, thereby making it impossible for a combined IRQ/BRK interrupt handler to test Bit 4 in order to determine whether an IRQ or BRK has occurred. You may note that there is no RESET vector defined for the Native mode. A Native mode RESET vector is not necessary because the 65C816 switches itself to Emulation mode whenever a RESET occurs and as a result always fetches the RESET vector from the Emulation mode location of $FFFC,D. This leaves the Native mode vector location of $FFEC,D reserved for future implementation.

65C816 Interrupt Vector Locations

Emulation Mode		Native Mode	
Interrupt Vector	Location	Interrupt Vector	Location
IRQ/BRK	$FFFE,F	IRQ	$FFEE,F
RESET	$FFFC,D	(reserved)	$FFEC,D
NMI	$FFFA,B	NMI	$FFEA,B
ABORT	$FFF8,9	ABORT	$FFE8,9
(reserved)	$FFF6,7	BRK	$FFE6,7
COP	$FFF4,5	COP	$FFE4,5

Vector Access on the SuperCPU

Implementing the additional 65C816 interrupt vector locations was a challenge during the design of the SuperCPU. Upon examination, you will find that all the Native mode vectors (locations $FFE4—$FFEF) and the Emulation mode COP and ABORT vectors are located within the Kernal Jump Table! At first glance this seems to preclude the use of Native interrupts, ABORT or COP while the Kernal ROM is in context. Luckily, the 65C816's designers may have forseen such a circumstance and have provided the VPB signal which, when asserted, indicates when a vector fetch is taking place. The SuperCPU PLD decodes VPB and can remap memory so that the vectors are fetched from a table in another location.

Although the problem of accessing the additional vectors was solved, there were still some issues regarding compatibility with the C64/128 operating system that had to be addressed. In order to guarantee 100% compatibility with existing Commodore programs, the existing IRQ/BRK and NMI vectors and interrupt routines had to be duplicated exactly. This was no problem because the 65C816 in Emulation mode will execute the existing Kernal interrupt routines properly.

With the compatibility issue solved we moved on to the next problem—how to provide enhanced interrupt services in the Kernal for the 65C816 Native mode and for situations where an Emulation mode interrupt occurs when the SuperCPU hardware registers have been enabled. To solve these problems a second vector table was added that is accessed when one or more of the following conditions is true:

1) The 65C816 is in Native mode
2) The SuperCPU hardware registers are enabled ($D0B2 Bit 7 = 1)
3) The System 1MHz flag is true ($D0B2 Bit 6 = 1)
4) The DOS Extension mode is enabled ($D0BC Bit 7 = 1)
5) The RAMLink hardware registers are enabled ($D0BC Bit 6 = 1)

The enhanced vector table directs interrupts that occur under the above circumstances to a new set of routines in the SuperCPU Kernal.

Note: When the Kernal ROM is switched out, the vectors are accessed from the RAM 'under' the Kernal ROM. As on the C64, the programmer in this case must provide his own vector table and interrupt service routines.

Native Mode Interrupt Servicing

In order to provide compatibility with existing Commodore programs, the SuperCPU Kernal is by necessity an 8-bit operating system. This includes the Kernal interrupt service routines that scan the keyboard and control RS-232 communications. With new SuperCPU programs, a problem arises when the Kernal must service an interrupt that is generated while the 65C816 is in Native mode. To solve the problem, the Native mode interrupt service routines in the SuperCPU Kernal first save the 16-bit register values on the stack along with a re-entry address and then switch the 65C816 to Emulation mode. Control is then passed to the enhanced Emulation mode interrupt routines which perform the interrupt processing. When interrupt processing has finished, the re-entry routine switches the processor back to Native mode and restores the 16-bit registers.

Handling Native interrupts in this manner makes it easy for programmers to write new software for the SuperCPU that takes advantage of the 16-bit registers and other advanced features of the 65C816. Unless the Kernal ROM is switched out, programmers do not need to include any interrupt handlers to provide special service to interrupts that occur while the 65C816 is in Native mode. In addition, because the Kernal takes care of the switching from Native to Emulation mode, existing custom interrupt handlers do not have to be re-written and can be used as-is by linking into the standard Kernal redirection vectors at $0314—$0319.

Enhanced Emulation Mode Interrupt Servicing

Even in Emulation mode, the SuperCPU uses special registers that change the memory map. Because of this, additional interrupt routines had to be included in the Kernal to handle interrupts that occur when the memory map is not in its default configuration. The enhanced Emulation mode interrupt routines first save the status of the Hardware Register Enable Bit, the System 1MHz bit, the DOS Extension Mode bit, and the RAMLink Hardware Enable bit on the stack. These bits are then set to their default values (thereby restoring the default memory map) and a re-entry address is pushed on the stack. Control is then passed to the standard Commodore Kernal interrupt routines. After the interrupt routines have finished, the re-entry routine pulls the configuration bits off the stack, restores the memory map and then returns to the interrupted program.

Because the standard Kernal interrupt routines are utilized, programs can still redirect the Emulation mode interrupt routines by using the standard redirection vectors at $0314—$0319.

The Enhanced Interrupt Redirection Jump Table

In order to provide programmers with complete control over both Native mode and enhanced Emulation mode interrupt servicing, the SuperCPU Kernal includes the Interrupt Redirection Jump Table. If a programmer does not wish to let the Kernal take care of interrupt processing, the jump

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table addresses can be changed so that interrupt servicing is redirected to custom interrupt handlers. For example, by changing the jump table a Native mode program can bypass the Kernal routines that switch the processor into emulation mode during interrupts; thus allowing the use of custom Native code interrupt handlers.

Each jump table location contains a JML instruction and a 3-byte long address operand. The JML is the first instruction executed during a Native mode or enhanced Emulation mode interrupt, thus giving the programmer the ability to redirect the entire interrupt processing routine.

Because the SuperCPU incorporates a dual-layer Kernal, the redirection address must be changed in two locations. Both locations are given in the table below. For example, to redirect the Native mode IRQ interrupt (located at $01FCAC in the jump table) a programmer would take the following steps:

1) Write the low byte of the new address to $01FCAD & $017CAD
2) Write the high byte of the new address to locations $01FCAE & $017CAE
3) Write the bank# of the new address to locations $01FCAF & $017CAF

Note: We did not write to locations $01FCAC & $017CAC because the JML opcode is stored in these locations.

Enhanced Interrupt Redirection Jump Table

Location 1	Location 2	Vector	Default
$01FC80	$017C80	JML EMUL. COP	XRTI
$01FC84	$017C84	JML (reserved)	XRTI
$01FC88	$017C88	JML EMUL. ABORT	XRTI
$01FC8C	$017C8C	JML EMUL. NMI	ENMI
$01FC90	$017C90	JML EMUL. RESET	CPURES
$01FC94	$017C94	JML EMUL. IRQ/BRK	EIRQ
$01FC98	$017C98	JML NATIVE COP	XRTI
$01FC9C	$017C9C	JML NATIVE BRK	NBRK
$01FCA0	$017CA0	JML NATIVE ABORT	XRTI
$01FCA4	$017CA4	JML NATIVE NMI	NNMI
$01FCA8	$017CA8	JML (reserved)	CPURES
$01FCAC	$017CAC	JML NATIVE IRQ	NIRQ

SuperCPU Native Mode Interrupt Handler

Listed below is the current SuperCPU 64 Native mode interrupt handler. Its function is to save the 16-bit register values, perform the necessary steps required to switch the processor into Emulation mode, and then jump to the Emulation mode interrupt handler. One of the more complex elements is the sequence required to save and switch the current Native mode stack which may reside anywhere within the full 64K range of Bank 00. Programmers wishing to include an interrupt handler that performs a switch from Native to Emulation mode may use the following routine as a guide.

```
;(COP & ABORT ROUTINE)----------------------------

XRTI    RTI             ;DON'T DO ANYTHING

;(NATIVE MODE NMI ROUTINE)-----------------------

NNMI    REP %00110000   ;ALL REGISTERS 16-BIT
        PHY             ;SAVE .Y (16 BITS)
        LDY #$00A4      ;$A4 IS PSEUDO NMI STATUS
                        ;AFTER SWITCH TO EMUL. MODE
        BNE GNI         ;BRANCH ALWAYS

;(NATIVE MODE BRK ROUTINE)-----------------------

NBRK    REP %00110000   ;ALL REGISTERS 16-BIT
        PHY             ;SAVE .Y (16 BITS)
        LDY #$0034      ;$34 PSEUDO BRK STATUS
        BNE GNI         ;BRANCH ALWAYS

;(NATIVE MODE IRQ ROUTINE)-----------------------

NIRQ    REP %00110000   ;ALL REGISTERS 16-BIT
        PHY             ;SAVE .Y (16 BITS)
        LDY #$0024      ;$24 PSEUDO IRQ STATUS

GNI     PHX             ;SAVE .X (16 BITS)
        PHA             ;SAVE .A (16 BITS)
        TSX             ;GET STACK PTR (16 BITS)
        TXA             ;TO .A REG.
        AND #$FF00      ;MASK OFF LOWER BYTE
        CMP #$0100      ;WAS STACK WITHIN PAGE 1?
        BEQ +           ;YES - LEAVE STACK ALONE
        LDA #$01FB      ;NO - LOAD NEW STACK VALUE
        TCS             ;TRANSFER TO STACK POINTER
+       PHX             ;SAVE OLD STACK PTR VALUE
        SEC             ;MAKE THE SWITCH
        XCE             ;TO EMULATION MODE
                        ;(ALL REGISTERS NOW 8 BITS)
        PEA NRTIIN      ;PUSH RE-ENTRY ADDRESS
        TYA             ;GET/TEST PSEUDO-STATUS
        PHA             ;PUSH STATUS VALUE
        BPL EIRQ        ;BRANCH IF IRQ/BRK
                        ;NMI FALLS THRU TO 'ENMI'
```

SuperCPU Emulation Mode Interrupt Handler

The SuperCPU 64 enhanced Emulation mode interrupt handler performs a number of functions not present in the standard Commodore Kernal interrupt routines. These functions are necessary to save and restore additional 65C816 registers and the current SuperCPU hardware state. The additional registers saved are the .B register, the Direct Register and the Data Bank Register. The Direct Register and Data Bank register are then both cleared to 0.

The SuperCPU and RAMLink hardware states are saved as well, and then cleared to their default values (SuperCPU hardware out, DOS Extension mode off, System Speed = Turbo, and RAMLink hardware out). The handler then pushes the re-entry address ('RTIIN') on the stack so that the handler can regain control upon RTI and restore the SuperCPU and RAMLink hardware states and additional 65C816 registers.

```
;(EMULATION MODE NMI ROUTINE)--------------------

ENMI    SEC             ;FLAG FOR LATER
        BCS IENTR       ;BRANCH ALWAYS

;(EMULATION MODE IRQ/BRK ROUTINE)----------------

EIRQ    CLC             ;FLAG FOR LATER
IENTR   PHA             ;SAVE .A
        LDA #$00        ;USE LATER TO CLR DIRECT
        XBA             ;EXCHANGE .B & .A
        PHA             ;SAVE .B
```


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```
        LDA #$00        ;READY TO CLEAR DIRECT REG.
        PHD             ;SAVE DIRECT REGISTER
        TCD             ;DIRECT REGISTER =$0000
        PHB             ;SAVE DATA BANK REGISTER
        PHA             ;PUSH $00 ON STACK
        PLB             ;DATA BANK REGISTER =$00
        LDA $D0B2       ;H/W REG & SYS SPEED STATUS
        STA $D073       ;SET SYS SPEED TO TURBO
        PHA             ;SAVE H/W & SYS SPD STATUS
        LDA $D0BC       ;GET DOS EXT. & RL STATUS
        PHA             ;SAVE IT
        AND #%01000000  ;TEST FOR RAMLINK H/W IN
        BEQ ++          ;BRANCH NO
        BCC +           ;BRANCH IF IRQ/BRK
        STA $DF20       ;IF NMI, RL WRT PROTECT OFF
+       STA $DF7F       ;SWITCH OUT RL H/W REG.
+       STA $D0BF       ;CPU DOS EXT. MODE OFF
        PEA RTIIN       ;SETUP RE-ENTRY ADDRESS
        LDA (10,S)      ;STATUS REGISTER FROM STACK
        PHA             ;PUSH IT
        STA $D07F       ;CPU HARDWARE OUT
        LDA (10,S)      ;.A REGISTER FROM STACK
        BCS +           ;BRANCH IF NMI
        JMP $FF48       ;IRQ/BRK TO STOCK ROUTINE
+       JMP ($0318)     ;NMI
```

SuperCPU Emulation Mode Re-entry Routine

The Emulation mode re-entry routine restores the SuperCPU and RAMLink hardware states and additional 65C816 registers. Control is passed to this routine when the stock interrupt routine executes an RTI. Re-entry was enabled by the interrupt handler above which pushed the re-entry address (PEA RTIIN) and the status register value on the stack.

```
RTIIN   STA $D07E       ;CPU HARDWARE IN
        PLA             ;GET DOS EXT. & RL STATUS
        STA $D0BC       ;RESTORE DOS/RL STATUS
        AND #$40        ;TEST FOR RAMLINK ENABLED
        BEQ +           ;NO - SKIP
        STA $DF7E       ;YES - RE-ENABLE RAMLINK
+       PLA             ;GET CPU REG. & SYS SPD
        STA $D0B2       ;RESTORE CPU REG. & SYS SPD
        PLB             ;RESTORE DATA BANK REGISTER
        PLD             ;RESTORE DIRECT REGISTER
        PLA             ;GET .B FROM STACK
        XBA             ;RESTORE .B
        PLA             ;RESTORE .A
        RTI
```

SuperCPU Native Mode Re-entry Routine

The Native mode re-entry routine re-enables Native mode, then restores the stack pointer and 16-bit register values. Control is passed to this routine when the Emulation mode re-entry routine executes its RTI. Re-entry was enabled by the Native interrupt handler which pushed the re-entry address (PEA NRTIIN) and the status register value on the stack.

```
NRTIIN CLC              ;SWITCH TO
       XCE              ;NATIVE MODE
       REP %00110000    ;ALL REGISTERS 16-BIT
       PLA              ;GET OLD STACK LOCATION
       TCS              ;AND RESTORE IT
       PLA              ;RESTORE .A
       PLX              ;RESTORE .X
       PLY              ;RESTORE .Y
       RTI
```

Sample Native-Mode-Only Interrupt Handler

The interrupt handler below is provided for programmers who wish to install their own Native-mode-only interrupt routine. All 65C816 registers are saved along with the current SuperCPU and RAMLink hardware states. This routine contains elements found in both the SuperCPU Native and Emulation mode interrupt handlers, but is much more efficient because the switch to Emulation mode is not performed.

The routine is installed by changing the appropriate entry in the Interrupt Redirection Jump Table. Note: This routine changes the Direct Register to $0000 and the Data Bank Register to $00. However, the programmer is free to substitute other values as required by the custom interrupt routine.

```
;(SAMPLE NATIVE-MODE-ONLY INTERRUPT ROUTINE)-----

IENTER REP %00110000    ;ALL REGISTERS 16-BIT
       PHA              ;SAVE .A,.B
       PHX              ;SAVE .X
       PHY              ;SAVE .Y
       PHD              ;SAVE DIRECT REG.
       LDA #$0000       ;ALL 16 BITS = 0
       TCD              ;DIRECT REGISTER = $0000
       SEP %00100000    ;ACCUMULATOR 8-BIT
       PHB              ;SAVE DATA BANK REGISTER
       PHA              ;PUSH $00 ON STACK
       PLB              ;DATA BANK REGISTER =$00
       LDA $D0B2        ;H/W REG & SYS SPEED STATUS
       STA $D073        ;SET SYS SPEED TO TURBO
       PHA              ;SAVE H/W & SYS SPD STATUS
       LDA $D0BC        ;GET DOS EXT. & RL STATUS
       PHA              ;SAVE IT
       AND #%01000000   ;TEST FOR RAMLINK H/W IN
       BEQ +            ;BRANCH NO
       STA $DF20        ;RL WRT PROTECT OFF
+      STA $DF7F        ;SWITCH OUT RL H/W REG.
+      STA $D0BF        ;CPU DOS EXT. MODE OFF
       STA $D07F        ;CPU HARDWARE OUT

       (CUSTOM INTERRUPT SERVICE ROUTINE HERE)

IEXIT  SEP %00100000    ;ACCUMULATOR 8-BIT
       STA $D07E        ;CPU HARDWARE IN
       PLA              ;GET DOS EXT. & RL STATUS
       STA $D0BC        ;RESTORE DOS/RL STATUS
       AND #$40         ;TEST FOR RAMLINK ENABLED
       BEQ +            ;NO - SKIP
       STA $DF7E        ;YES - RE-ENABLE RAMLINK
+      PLA              ;GET CPU REG. & SYS SPD
       STA $D0B2        ;RESTORE CPU REG. & SYS SPD
       PLB              ;RESTORE DATA BANK REGISTER
       REP %00110000    ;ALL REGISTERS 16-BIT
       PLD              ;RESTORE DIRECT REGISTER
       PLY              ;RESTORE .Y
       PLX              ;RESTORE .X
       PLA              ;RESTORE .A
       RTI
```


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Hard Tips

NTSC/PAL CONVERSION

by Doug Cotton

A few issues back, we mentioned that we may present information on converting the C64 computer between the NTSC/PAL standards. We recently received a letter from one of our subscribers in Europe, asking us to follow through on publishing that information. We're pleased to do so in this issue, and hope that it will assist users who need to convert their machines.

There are any of a number of reasons you may need to convert your C64 to a different video standard. You may have moved to a different country, or maybe you just want a second machine to try out games or demo programs that came from overseas. While the conversion is a reasonably simple process, you'll need some skills in using a soldering iron. Naturally, we do not recommend this process for anyone who lacks experience with removing components from circuit boards.

Assuming you have the required parts (see table below), the first step is to open the computer case and remove the circuit board. Depending on the version of 64 you have (and which way the wind was blowing in West Chester), you may have to remove a shield from the board, or desolder and bend away tabs that hold the board in place.

Once you have the board out, you need to try and determine what version it is. There are five different versions of the C64 motherboard, Revisions A through E (Revision E is sometimes marked as Rev. 4—apparently Commodore started at zero). Usually you can find the revision number printed in white letters on the board, with two exceptions: 1) Revision A boards had the version number etched on the board near the front-center, and 2) Revision C & D boards were often unmarked as such, but usually have a copyright date of 1984 or later stamped on them.

Everything we need to change is part of the video circuit, and located in the same general area. If you have a Rev. E (or 4) board, this circuitry is located at the center of the board near the front edge; on Revisions A through D you'll find it to the right of center, about an inch or so back from the front edge. Rev. A through D were also designed to have a metal box around the video circuit (don't confuse this with the RF modulator, which is the metal box at the rear), but these weren't always installed. Also, some that have the box may have a cover over it; remove it if yours has one. Check the layout against the diagrams to the right to verify that you have found it, and have the correct revision.

Now locate the VIC chip (U7 on Rev. E, U19 on all others). If it is socketed, your job will be easier; just remove it from the socket. If it is soldered in, we suggest you use a small pair of sidecutters to carefully clip each pin close to the body of the chip, then desolder each of the legs individually. (We suggest this method because if you try to desolder and remove the entire chip at once without special tools you may pull some traces off the board and ruin your computer!) After desoldering and removing the legs, we suggest you clean the holes out with a solder-sucker (Radio Shack has these), and install a 40-pin socket so that you'll be able to plug in your new VIC chip easily. However, don't install your new VIC chip just yet.

Next, locate and desolder the clock crystal, component Y1. This should be pretty easy, as there are only two leads (some crystals may also have a wire soldered to the case as well, which should be desoldered). Replace the crystal with a new one matching the frequency given in the table below.

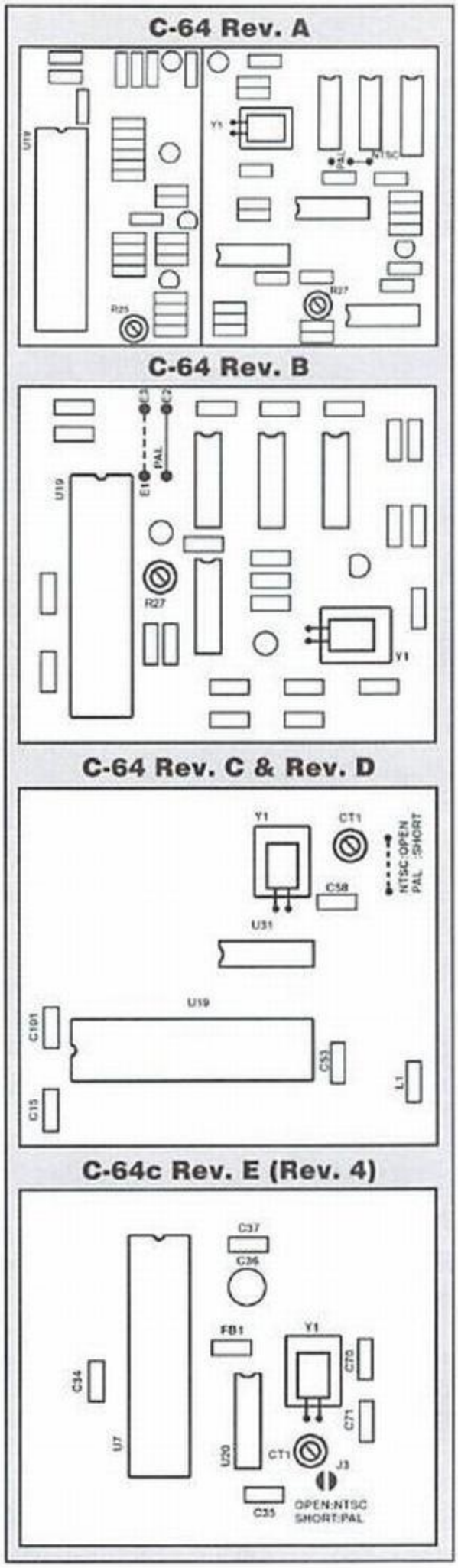
Finally, change the jumper configuration. On Rev. E boards this is a pair of half-moon shaped traces labelled J3, join the two halves for PAL, or break any connection between them for NTSC. On Rev. A there are three solder pads with NTSC and PAL printed nearby; connect the center to the right for NTSC, or the center to the left for PAL (make sure you break the other connection). Rev. B has four pads labelled E1, E2, E3 and PAL; short E1 to E3 for NTSC, or E2 to PAL for PAL (and break the other connection). Rev. C & D have two pads with a broken line printed between them; solder a wire between them for PAL, or break the connection for NTSC.

Now you can install the new VIC chip in the socket, and place the C64 board back into the bottom half of the case. Before you put the cover back on, hook it up and make sure it is working. You may need to adjust the variable capacitor CT1 (Rev. C, D & E) or the variable resistor R27 (Rev. A or B) in order to get the color working correctly.

Also note that there is another jumper on the C64 board to switch between PAL-G and PAL-I standards (G is the default, and most commonly used standard). This jumper controls the RF modulator. However, you can ignore this if you convert a machine, as this module will no longer function. That's right—no TV output unless you get the correct RF modulator unit and replace the one you have.

PARTS LIST

	Crystal	VIC
NTSC	14.31818 MHz	6567
PAL	17.73447 MHz	6569



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CHECKSUM

Commodore World's Program Entry Checking Program and Tips on Entering Programs from this Magazine

CHECKSUM is a program that proofreads your typing when you enter a listing from the magazine. It assigns a numerical value to each character that you type, adds up the values of the line you typed and displays the sum. (Checksum, therefore, means that it checks your typing by summing the characters.) It also verifies that you have typed the characters in the proper order. (Checksum won't tell you if you miss a line of code entirely, so verify that yourself.) Checksum runs "in the background" when you type in lines of program code. Whenever you type a line and press RETURN, Checksum will display a value. Compare that value to the value published next to the line of code in the magazine. If the numbers match, you've typed the line correctly. Simple.

Typing in CHECKSUM

First, type in Checksum carefully from the listing on this page. Be sure to press RETURN after every line to enter it into memory. Once you have typed the program, *save it*. In fact, save it a few times while you're typing, just to be safe. (This is good advice whenever you type in a program. I usually change the name each time I save; for example, Checksum1, Checksum2, and so on.) Double-check your work, making sure that you've typed in every line and that you've pressed RETURN after every line you've typed. If you make errors when typing in Checksum, a test run of Checksum will tell you which line is incorrect. (This safety feature works only in the Checksum program itself, and does not apply to any other listings in the magazine.) Whenever you find a typing error (in any program listing), fix it, press RETURN to enter the change, save the program again and try another run. Repeat this process as often as necessary. Important tip: Don't get discouraged if the program won't run. Be patient. Be thorough. It will work eventually. You'll know your Checksum is ready when you see the line:

```
TO TOGGLE ON OR OFF, SYS XXXX
```

Entering Programs Using CHECKSUM

When you're ready to type in your first listing from the magazine, load and run Checksum. Make a note of the number that is displayed on the screen (49152 for the C-64; 3328 for the C-128). To activate and deactivate Checksum, type SYS followed by that number, then press RETURN. You need to have Checksum active whenever you're typing in a listing. Checksum must be deactivated, however, when you run the new program. The next step is typing in a new program listing as it appears in the magazine.

As you begin, you'll notice that to the left of the start of each line is a number. Don't type this number in: It's simply the Checksum value. Stop typing at the end of the program line and press RETURN. If you've typed the line correctly, the number displayed on the screen will match the Checksum value. If the numbers don't match, you've made a mistake. Check the line carefully, make your changes and press RETURN. The computer won't know you've made a change unless you press RETURN on the changed line to enter it. A few type-in hints: The Checksum does not verify blank spaces in the program lines unless they are within quotation marks, because adding or omitting such spaces will not affect the operation of the program. The exception to this is hexadecimal Data statements. These are the Data statements, such as this one, that don't have commas:

```
100 DATA 123456789012345678901234567890*123456789012345
67890*12345678901234567890*
```

In statements such as these, you must have one space between the word DATA and the numbers that follow. Checksum will not catch that error.

Special Key Combinations

As you type, you may be confused the first time you see curly braces {}. These braces mean "perform the function explained within." For example, {22 SPACES} means that you need to press the space bar 22 times. Don't type the braces (you can't, of course, because there are no curly braces in the Commodore character set). Here are some other common examples:

{CLEAR/HOME}	hold down the SHIFT key and press the CLR-HOME key.
{2 CRSR DN}	tap the cursor down key twice.
{CTRL i}	hold the CONTOL key and press the I key.
{CMDR t}	hold down the COMMODORE key and press the T key.

Continue typing in your program, saving often and checking each checksum value with the one in the magazine, until you've finished the listing. Phew! So now you're ready to run your program, right? Not quite. First, save it. Second, deactivate Checksum by typing SYS followed by 49152 for the C-64 or 3328 for the C-128. Now you can run. Don't be discouraged if you still get an error. It happens. Use Checksum faithfully. Be patient. Be thorough. It will work eventually.

CHECKSUM

```
100 rem cw checksum 64/128
110 mo=128:sa=3328
120 if peek(65533)<>255 then mo=64:sa=49152
130 i=0:ck=0:ch=0:ln=300
140 for k=0 to 16
150 for j=1 to 10
160 read b:if b>255 then goto 280
170 ch=ch+b:poke sa+i,b:i=i+1
180 next j
190 read lc:if lc<>ch then goto 280
200 ch=0:ln=ln+10
210 next k
220 pokesa+110,240:pokesa+111,38:pokesa+140,234
230 printchr$(147):print"cw checksum";str$(mo):print
240 print"to toggle on or off, sys";sa:if mo=128 then 270
250 pokesa+13,124:pokesa+15,165:pokesa+25,124:pokesa+26,165
260 pokesa+39,20:pokesa+41,21:pokesa+123,205:pokesa+124,189
270 pokesa+4,int(sa/256):sys sa:new
280 print"you have a data error in line";ln;"!":end
290 rem do not change these data statements!
300 data 120,162,24,160,13,173,4,3,201,24,884
310 data 208,4,162,13,160,67,142,4,3,140,903
320 data 5,3,88,96,32,13,67,152,72,169,697
330 data 0,141,0,255,133,176,133,180,166,22,1206
340 data 164,23,134,167,132,168,170,189,0,2,1149
350 data 240,58,201,48,144,7,201,58,176,3,1136
360 data 232,208,240,189,0,2,240,42,201,32,1386
370 data 208,4,164,180,240,31,201,34,208,6,1276
380 data 165,180,73,1,133,180,230,176,164,176,1478
390 data 165,167,24,125,0,2,133,167,165,168,1116
400 data 105,0,133,168,136,208,239,232,208,209,1638
410 data 169,42,32,210,255,165,167,69,168,170,1447
420 data 169,0,32,50,142,169,32,32,210,255,1091
430 data 32,210,255,169,13,32,210,255,104,168,1448
440 data 96,104,170,24,32,240,255,104,168,96,1289
450 data 56,32,240,255,138,72,152,72,24,162,1203
460 data 0,160,0,32,240,255,169,18,208,198,1280
```


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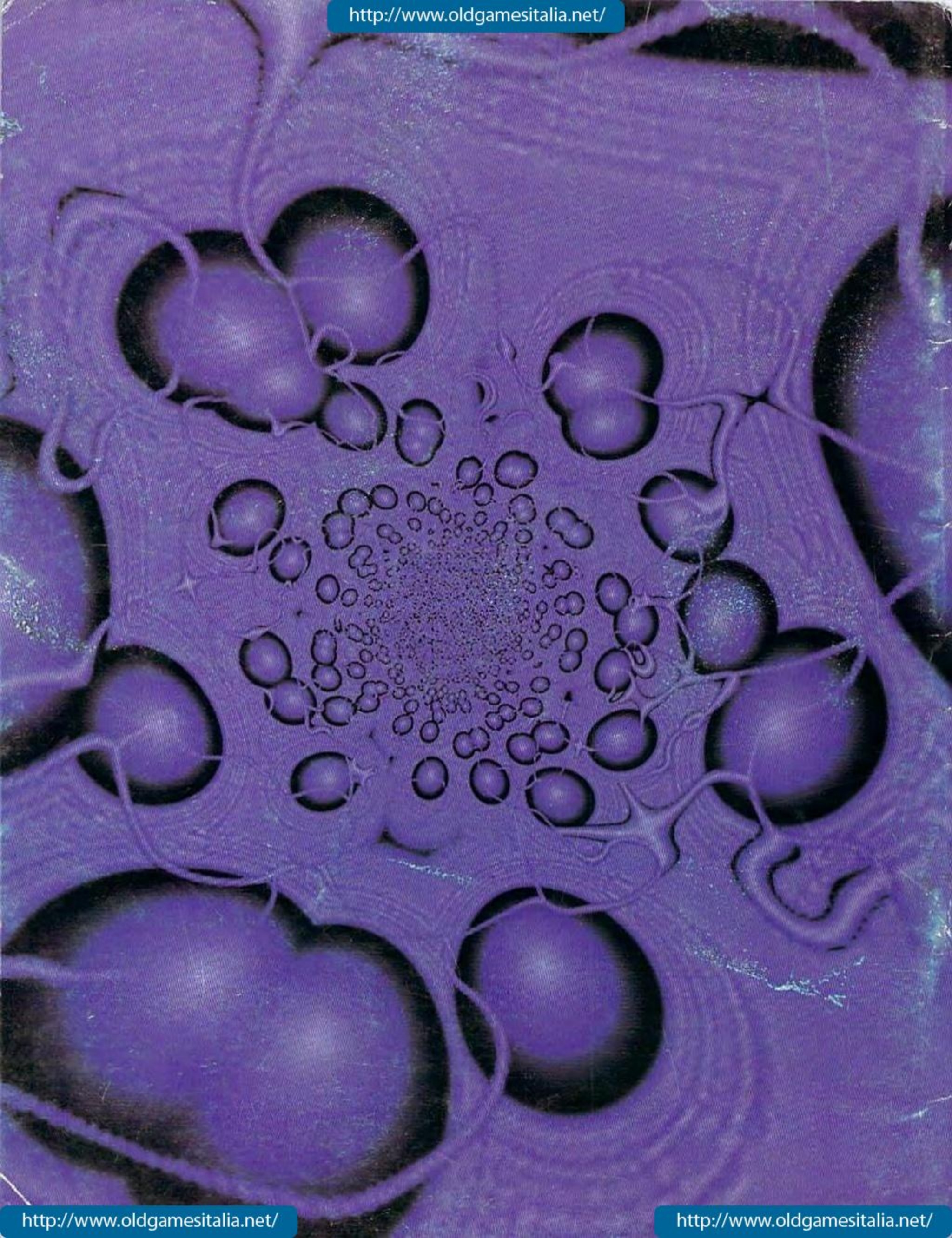

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